Saguaro National Park
Arizona

National Park Service
U.S. Department of the Interior

# SAGUARO NATIONAL PARK

## Comprehensive Trails Management Plan / Environmental Assessment

February 2009

# Saguaro National Park Comprehensive Trails Management Plan

## Environmental Assessment


### Summary

Saguaro National Park proposes to locate, add, eliminate, manage, and maintain trails and associated infrastructure in a comprehensive trails system based on resource protection and visitor use and enjoyment. The plan is needed to protect natural and cultural resources, while providing safe, reasonable access to the park's trail system for a wide variety of user groups.

This Environmental Assessment evaluates a no action alternative and four action alternatives in the Rincon Mountain District (RMD) of the park and a no action alternative and three action alternatives in the Tucson Mountain District (TMD). All action alternatives are based on laws, regulations and policies, public health and safety, and the objectives of this plan. The no action alternative represents current conditions and is also a baseline for comparison to the action alternatives for each respective district.

Alternative A for both districts focuses on providing reasonable access and a variety of trail recreational experiences while minimizing redundancy in some high density areas. Both existing and new trails were evaluated in terms of access to attraction sites, variety in terrain, vegetation type, user type, popularity, safe travel, as well as resource protection and sustainability. As a result, some trails in high density areas would be eliminated from the trail system. New trails would link with U.S. Forest Service (USFS) and Pima County lands to ensure continuity of appropriate trail recreation on neighboring lands

Alternative B for both districts focuses on retaining sustainable trails in some of the more popular or well-established areas of the park, while protecting natural and cultural resources in other areas of the park. To offset resource and maintenance concerns associated with higher densities, some multiuse trails that have sustainability issues would be converted to single-use trails.

Alternative C (RMD only) was submitted by the Saguaro Concerned Trail Users, a local interest group. The stated concept of this alternative is "providing trails that are safe, offer variety and convenience, are sustainable over the long term, meet user demand for multiuse, and disperse users to reduce perceptions of crowding."

Public comments were received on alternatives A, B, and C during public meetings and newsletter comment periods. The preferred alternative was constructed from desired components of each of the action alternatives based on public comments and the objectives of this trails plan.

This Environmental Assessment has been prepared in compliance with the National Environmental Policy Act (NEPA) to provide the decision-making framework that 1) analyzes a reasonable range of alternatives to meet project objectives, 2) evaluates potential issues and

impacts to Saguaro National Park's resources and values, and 3) identifies mitigation measures to lessen the degree or extent of these impacts. Resource topics that have been addressed in this document include vegetation, wildlife, soils, archeological, historic sites and structures, wilderness values, visitor use and experience, and park management and operations. All other resource topics have been dismissed because the project would result in negligible or minor effects to those resources. No major effects are anticipated as a result of this project.

**Public Comment**

If you wish to comment on the Environmental Assessment, you may enter your comments online at the National Park Service website Planning, Environment, and Public Comment (http://parkplanning.nps.gov/sagu) or you may mail comments to the name and address below. This Environmental Assessment will be on public review for 30 days ending March 6, 2009. 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. While 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.

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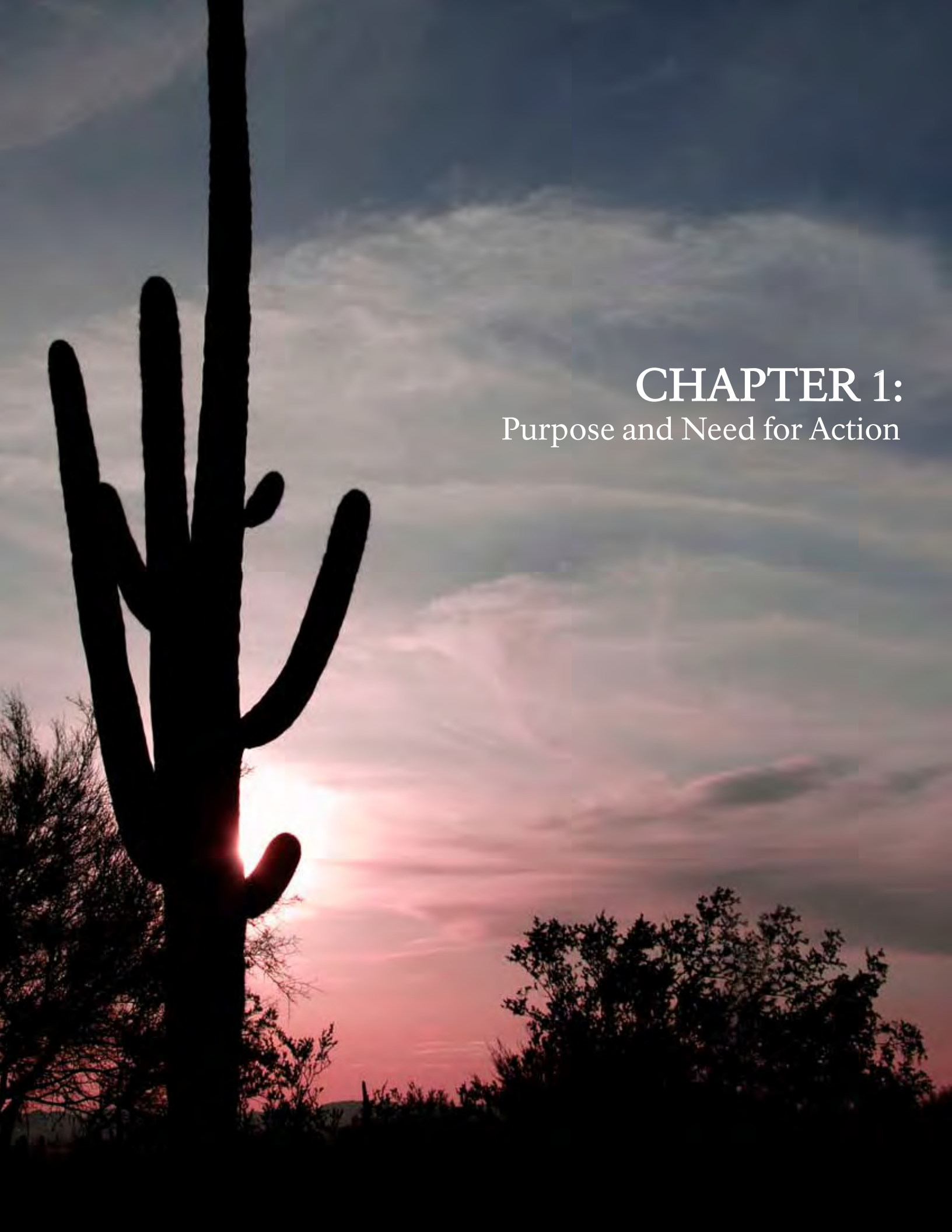
# List of Acronyms

| | |
|---|---|
| ACHP | Advisory Council on Historic Preservation |
| ATV | All-terrain Vehicle |
| ADA | Americans with Disabilities Act |
| ARPA | Archeological Resources Protection Act |
| APE | Area of Potential Effect |
| AGFD | Arizona Game and Fish Department |
| API | Asset Priority Index |
| BMP | Best Management Practice |
| BLM | Bureau of Land Management |
| CAA | Civilian Aeronautical Administration |
| CCC | Civilian Conservation Corps |
| CEQ | Council on Environmental Quality |
| ESA | Endangered Species Act |
| EA | Environmental Assessment |
| EPA | Environmental Protection Agency |
| FMSS | Facilities Management Software System |
| FMP | Fire Management Plan |
| GMP | General Management Plan |
| GIS | Geographic Information System |
| GPRA | Government Performance and Results Act |
| LOS | Levels of Service |
| MSO | Mexican Spotted Owl |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act |
| NPS | National Park Service |
| NRHP | National Register of Historic Places |
| NRCS | National Resource Conservation Service |
| PEPC | Planning, Environment, and Public Comment website |

| | |
|---|---|
| PA | Programmatic Agreement |
| PAC | Protected Activity Center |
| RV | Recreational Vehicle |
| RMD | Rincon Mountain District |
| SHPO | State Historic Preservation Officer |
| SOF | Statement of Findings |
| TMD | Tucson Mountain District |
| USACE | United States Army Corps of Engineers |
| USFWS | United States Fish and Wildlife Service |
| USFS | United States Forest Service |
| VIP | Volunteers in Parks |



# CHAPTER 1:
## Purpose and Need for Action

# Chapter 1: Purpose and Need for Action

## Introduction

Saguaro National Park is located in Pima County, AZ and consists of two distinct districts, separated by the city of Tucson: The Rincon Mountain District (RMD), located east of the Tucson metro area and the Tucson Mountain District (TMD), located west of the Tucson metro area (Figure 1). Saguaro National Park was established (as Saguaro National Monument) on March 1, 1933, to preserve and protect "the exceptional growth thereon of various species of cacti including the so-called giant cactus." On November 15, 1961, lands in the Tucson Mountains were added to the monument because "they 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." Subsequent legislation signed into law (PL 102-61, PL 103-364) enlarged the boundaries of both districts. On October 14, 1994, PL 103-364 also redesignated Saguaro National Monument to Saguaro National Park. Today, the Tucson Mountain (West) District and the Rincon Mountain (East) Districts totaled 91,440 acres (NPS 2002a). The Saguaro Wilderness Area was officially designated as wilderness in 1976 (NPS 2006e), and the park now includes 70,905 acres of wilderness (NPS 2005a), constituting approximately 78% of park lands.

Rapid urbanization in Pima County and the growing demand for multiple use trails to access public lands surrounding the Tucson area have resulted in a number of challenges for public land managers in the region. Some challenges facing Saguaro National Park include protecting soils, vegetation, and cultural resources in sensitive resource areas; accommodating a variety of user groups, including equestrians, bicyclists, and hikers; providing safe parking and trailhead access in key areas; maintaining a multiple number of trails that lead to the same attraction or area; providing access to the Arizona Trail; and locating new trails in appropriate areas that could provide access to less visited areas of the park.

## Background

Pima County has a population of more than 946,000, and the city of Tucson's population of more than 518,000 is growing rapidly (U.S. Census Bureau 2006). When the park districts were created, dirt roads connected these distant areas to the city. The 30 miles separating the two districts are now completely filled by the city of Tucson. The city limits are nearly at the park boundaries, and the park districts have become islands of preservation amidst growing urban development (NPS 2005a).

Some of the park's trails were poorly designed, particularly those on steep slopes, and require extensive maintenance. In the northeast corner of the TMD, no trails planning has ever occurred, and multiple access points and social trails exist (similar problems affect the East Boundary and Northwest planning areas of this district as well). Many trails are unsafe and present logistical problems associated with trail work and maintenance.

Certain areas of the park experience high levels of visitor density, which affects resources, such as the saguaro forest and riparian areas, that are particularly sensitive to visitor use. The density and location of trails influence wildlife habitat, the presence of threatened and endangered species, and the protection of cultural resources. Extensive visitor use has led to trail widening, soil erosion, vegetation loss, and introduction of exotic species. Some areas have also experienced problems with vandalism and theft, for parts of the park have high densities of archeological sites, which are susceptible to such damage. Undesignated "social" trails affect sensitive resources and can increase erosion and the presence of exotic plants. Visitors are also using abandoned roads as trails, some of which lead to mine hazards or important cultural resources that require protection.

As visitor use has increased, so has the type of visitor activities, which has led to increased conflicts on park trails. Demand for particular types of activities, such as mountain biking, guided hikes, and horseback trips, have added increased pressure on the park's trail system. Some unlawful use of trails has also occurred, such as the use of mountain bikes in unauthorized areas and the presence of dogs where they are not allowed. Demand for parking and access to trails from surrounding high-density residential areas has also increased. Visitors have wanted more access to certain areas and to some specific park attraction sites. Parking has been a problem in many areas of the Cactus Forest Planning Area, raising safety concerns. There has also been insufficient trailhead parking for horse trailers.

## Description and History of Trails in the Park

The majority of the park's trails exist in the RMD, which contains approximately 128 miles of trails that traverse both desert and mountain areas. The RMD is popular among hikers and equestrians, and this unit experiences intense visitor use, particularly in the Cactus Forest Planning Area. The 0.25-mile paved Desert Ecology Trail, located along Cactus Forest Drive, is a self-guided trail that is accessible to visitors with disabilities. Other trails along the scenic drive, such as the Freeman Homestead Trail, are suitable for short hikes into the desert environment of this area. Several longer hiking trails penetrate the wilderness of the Rincon Mountains and their foothills. Few people visit this part of the park because it is accessible only by foot or horseback. Unlike trails in lowland cactus deserts, the Rincon Mountain trails cross woodlands of scrub oak and pine, and forests of ponderosa pine and Douglas fir, similar to those in the northern United States and southern Canada. Because many of the trails in this area intersect, trips of varying length can be planned. Horseback riding is permitted on most trails in the RMD. Backcountry camping is allowed at designated sites and requires permits obtained in advance (NPS 2002b).

There are approximately 43 miles of trails in the TMD (NPS 2004a). Two nature trails exist within a mile of the TMD visitor center. The Cactus Garden Trail follows a level paved walkway through desert plants. The accessible Desert Discovery Nature Trail loops 0.5 mile along the gently sloping bajadas at the foot of the Tucson Mountains. Another short trail, the Valley View Overlook Trail (0.8 mile round trip) has extensive saguaro forests and views of the mountains and

desert. Longer trails penetrate the Tucson Mountains and their foothills. Horseback riding is permitted on most trails. Camping is not permitted in this district (NPS 2002b).

## *Purpose of and Need for Action*

### Purpose

The purpose of the proposed action is to provide Saguaro National Park with a plan to locate, add, eliminate, manage, and maintain trails and associated infrastructure in a comprehensive trails system based on resource protection and visitor use and enjoyment.

### Need

The plan is needed to protect natural resources (such as soils, vegetation, and threatened and endangered species) and cultural resources while providing reasonable access to the park's trail system for a wide variety of user groups. The plan is also needed to ensure that the trails network is safe and maintainable and minimizes visitor conflicts.

### Objectives in Taking Action

Objectives define what must be achieved to a large degree for the proposed action to be considered a success (NPS 2001). All alternatives selected for detailed analysis must meet all objectives to a large degree as well as resolve the purpose of and need for action. The following objectives for this trails plan are grounded in the park unit's enabling legislation, purpose, significance, and mission goals:

- Prevent impairment and unacceptable impacts on natural and cultural resources.
- Provide reasonable access to the trails network and trailheads.
- Eliminate unnecessary and parallel/duplicate trails.
- Ensure that the resulting trails network is safe and maintainable.
- Provide for a clearly designated trail system.
- Provide for a variety of trail experiences.

## *Purpose and Significance of Saguaro National Park*

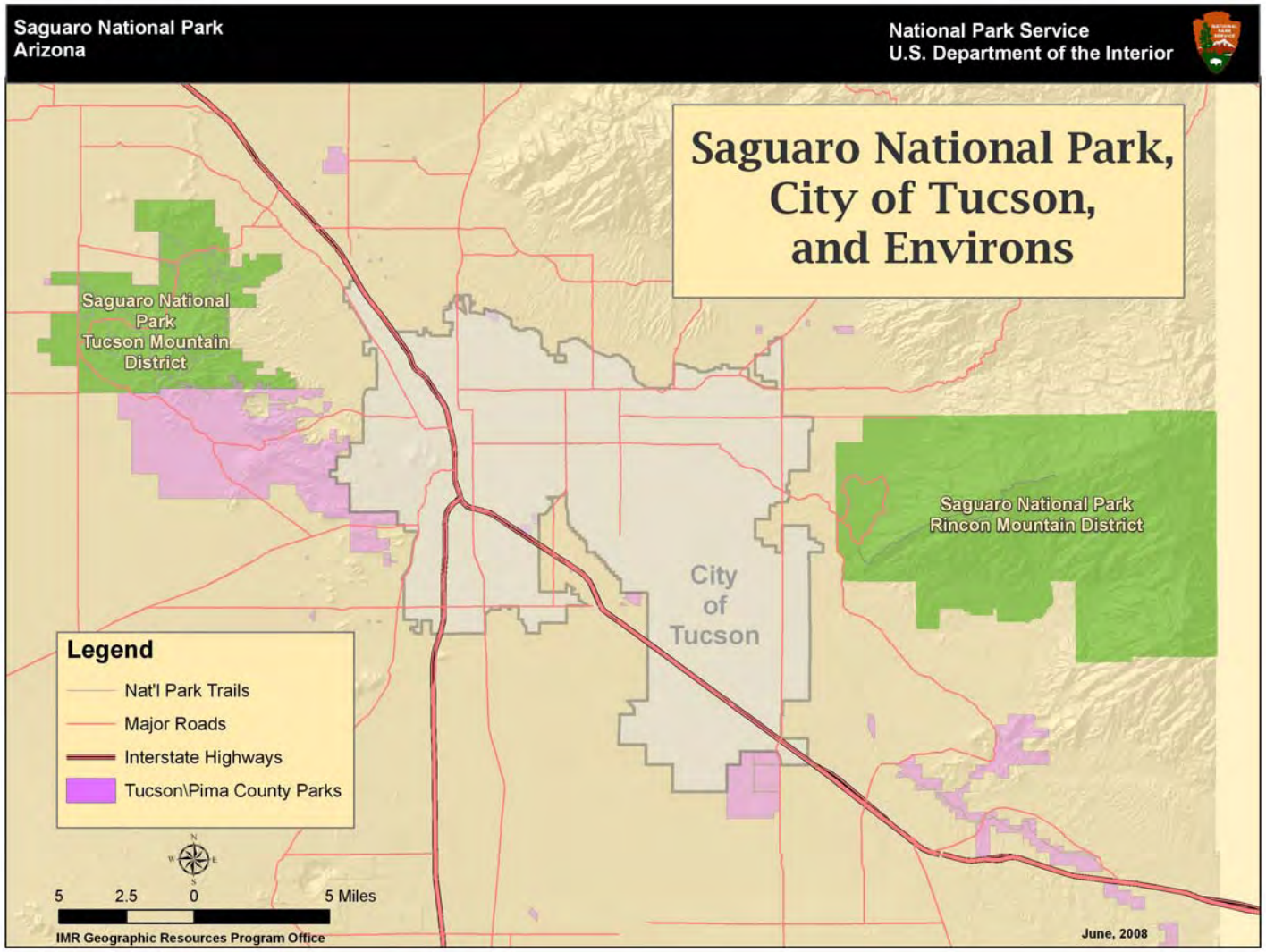
Congress establishes national park system units to fulfill specified purposes based on a park's unique and significant resources. All proposed projects (including this trails plan) must be consistent with a park's purpose, thereby conserving resources while providing for the enjoyment of future generations.

### Park Purpose

The following statements describe the purpose for Saguaro National Park:

- 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.

**Figure 1: Saguaro National Park Vicinity Map**



## Park Significance

Saguaro National Park is significant because of the following:

- 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

## *Previous Trails Planning*

Prior to development of the 2008 *General Management Plan* (GMP), several trails plans were created. As evidenced by the planning documents described below, the park has undertaken several actions that have shaped Saguaro's current trails system. This section briefly reviews these plans and the ensuing actions that were implemented. The development of this plan's alternatives (described in chapter 2) takes into consideration the actions identified in these documents. The effects of implementing these plans are assessed as cumulative impacts in chapter 4.

**Trails Management Plan Cactus Forest Section — Volume I. Rincon Mountain District Saguaro National Park — 1990**. This plan was developed to address increased recreational use at the park, the majority of which was based on the existing trail system at the time, described as "a complex of unnecessary and redundant trails." The plan's purpose states "a designated trails system has to be created that eliminates the existing chaotic system." The proposed system incorporated a redesign of the existing Cactus Forest section of trails to eliminate unnecessary trails and provide improved trails and trail access to points of interest. The plan proposed incorporating approximately 37% of the existing 110 miles of trails into a well-maintained and signed trail system. Another 13% (14 miles) were proposed for immediate elimination due to redundancy. The remaining 50% (more than 55 miles) of social trails would be eliminated over time to protect resources. This plan also proposed using washes as components of the trail system where they intersected existing trails (NPS 1990).

**Environmental Assessment for Tucson Mountain District Trail Plan — 1997**. Expanded to more than 24,300 acres in the late 1990s, the TMD was mostly undeveloped when established as a second unit of Saguaro National Monument in 1961. Prior to development of this plan, no formal trails plan had been completed to guide overall management and public use of the many trails in this district. While the National Park Service (NPS) had improved and maintained a limited network of designated trails, mostly in the southern half of the district, a system of undesignated social trails had evolved and constituted more than 80% of routes used in the district. Use of these social trails, particularly along the eastern and northern areas, increased as a result of residential development adjacent to the park. The plan's preferred alternative called for improving many existing social trails as part of a substantially enlarged trails system. Under this alternative, 25 miles of social trails would be added to the existing 16-mile trail system, 5 miles of social trails would be improved, and 4 miles of new trails would be constructed (NPS 1997).

**Rincon Valley Subregional Trails Plan — 1998**. This plan was developed by Pima County to create a network of trails in the Rincon Valley that would link Saguaro National Park, Coronado National Forest,

Colossal Cave Mountain Park, Cienega Creek Natural Preserve, and Pantano River Park. Rincon Valley is located south of Saguaro's RMD. The plan is a subregional elaboration for the *Eastern Pima County Trail System Master Plan*, adopted in 1989 and re-adopted with revisions in 1996.

One of the issues that led to creation of the plan included Saguaro National Park's expansion south towards Rincon Creek. The plan identified Saguaro's 3,500-acre expansion area as a "potential trail corridor that would provide public access to the south side of Saguaro National Park, which had been inaccessible to the public from the Rincon Valley for more than 30 years due to restrictions placed by private landowners." In particular, the plan advocated access to the Madrona Ranger Station, which would provide southern access to Saguaro National Park and the Rincon Mountains backcountry trails (public access to the Madrona Ranger Station was discontinued in the 1960s by the owners of the X9 Ranch). This plan included a 5.5-mile trail to the Hope Camp within the RMD expansion area. The plan recommended that this trail, open to public use but limited to horse and pedestrian traffic, be accessible to bicycles as well. The plan also proposed a 0.25-mile wash trail to Saguaro's boundary to provide a link from the park to the Coyote Wash Trail at Rincon Creek.

**Cactus Forest Trail Environmental Assessment / Assessment of Effect, Saguaro National Park — 2002**. During preparation of the 1990 trails management plan mentioned above, public scoping revealed an interest in mountain biking in the park. The NPS analyzed the appropriateness of establishing a mountain bike trail given such factors as park mission, park resource and visitor experience goals, and the existing spectrum of recreational uses. The NPS concluded that the Cactus Forest Trail met these criteria, and the park opened that portion of the trail inside the Cactus Forest Loop Road to mountain bike use for a one-year trial period. The park monitored the trail for resource and social impacts and decided to keep the trail inside the loop road open to bicycle use when the trial period ended. In April 2002, the park closed the trail to mountain biking in response to claims that the trail was initially opened without proper authorization. An environmental assessment (EA) was then prepared to examine the environmental and social impacts of reopening this portion of the trail to bicycle use. The preferred alternative proposed reopening this trail to such use, which would also include hiking and equestrian use. This resulted in the park writing a special regulation to allow mountain bike use along this designated section of trail (NPS 2002a).

## General Management Plan—2008

A park's GMP provides vision and policy guidance for the preservation of park resources, visitor use and experience, the types and general intensities of development, visitor carrying capacities, and opportunities to address management issues internal and external to the park. It also identifies connections among the various park programs and provides a policy framework for more site-specific planning.

Saguaro National Park has developed a GMP. This plan establishes the park's management direction for the next 15 to 20 years. Tiering off the foundation and direction established in the GMP, implementation plans (such as this trails plan) provide more site-specific direction and detailed actions needed to achieve resource conditions and visitor experiences described in the GMP. Implementation plans typically focus on a particular park program or area, but in more detail than the GMP. In accordance with *NPS Director's Order 2, Park Planning,* and *Director's Order 12, Conservation Planning, Environmental Impact Analysis, and Decision-making*, this trails plan follows the park purpose and significance, goals and objectives, management prescriptions, trail classifications, and indicators and standards that have been either established or reaffirmed in the GMP. From this direction, this trails plan provides implementation details regarding appropriate trail location, including trail addition and deletion; amount and type of use; materials; width; and signs.

Trail system criteria are defined in the GMP and include cultural resources, natural resources, visitor experience, and park operations. These criteria are included in detail in appendix A. Trail types are defined as Type A, Type B and Type C.

- Type A — Wheelchair accessible trails in the frontcountry that are constructed and maintained according to *Americans with Disabilities Act* (ADA) standards. The trails typically access primary park features. Trail surfaces would be hardened.
- Type B — Single or multiuse trails that are 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.
- Type C — Single or multiuse trails that are 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.

This plan also includes the location of new and existing trailheads and trailhead parking lots. These details are based on objectives defined in the GMP that must be met to implement this plan.

## *Guidance from Other Plans*

Several documents, legislative acts, and policies provide guidance to ensure that this plan satisfies the purpose and meets the needs. The development of this plan's alternatives (described in chapter 2) took into consideration the actions identified in the following documents specific to Saguaro National Park. The past, present, and reasonably foreseeable effects of implementing these plans are assessed in combination with impacts expected from this trails plan as cumulative impacts in chapter 4, where applicable.

### Strategic Plan — 2006

The park's *Strategic Plan* is written to fulfill the requirements of the *Government Performance and Results Act* (GPRA) of 1993. The *Strategic Plan* reexamined the park's fundamental mission and took a long range view of the results or outcomes needed to more effectively and efficiently accomplish that mission. The plan ensures that daily actions and expenditures of resources are guided by long- and short-term goal setting in pursuit of accomplishing the park's primary mission, followed by performance measurement and evaluation.

The alternatives developed for this trails plan uphold the *Strategic Plan's* mission statement, which reads:

> It is the mission of the NPS at Saguaro National Park to preserve, protect, and interpret the Sonoran Desert's many biotic communities, cultural features, and scientific, scenic, and wilderness values.

The long-term goals identified in the *Strategic Plan* are supported in this trails plan:

- Exotic vegetation on 10 (20%) of 50 targeted acres of park lands as of 1999 is contained.
- Two (67%) of three of the federally listed threatened and endangered species known to occur within Saguaro National Park, as of 1997, are in stable condition.
- Fifty-two (80%) of Saguaro National Park's 65 historic structures listed on the Fiscal Year 1999 NPS List of Classified Structures are in good condition.
- Three hundred twenty (82%) of Saguaro National Park's archeological sites listed on the Fiscal Year 1999 NPS Archeological Sites Management Information System, with condition assessments, are in good condition.
- Designated wilderness at the park fully meets 7 (70%) of 10 parameters established by the *Wilderness Act*, and NPS *Management Policies 2006.*
- Six (24%) of an estimated 25 indicators of resource condition at Saguaro National Park show that resource conditions are stable or improving.
- Ninety-seven percent of visitors to Saguaro National Park are satisfied with appropriate park facilities, services, and recreational opportunities.
- The visitor accident/incident rate at the park is reduced from the fiscal years 1992–96 annual average of 35 to 31 per 100,000 visitor days (11% reduction).

### Transportation Study — 2005

The park has conducted a transportation study which developed solutions related to visitor safety and impacts on wildlife resulting from high volumes of traffic on park roads. Data in this study indicates that some park roads exceed the level of service (LOS) for which they were designed. The park contains two types of road corridors: interior roads (such as Golden Gate Road) and through-park roads (such as Picture Rocks Road). The alternatives in this study call for converting some internal park roads to trails. The conversion of Golden Gate Road to a trail has been incorporated into the alternatives developed for this trails plan (NPS 2005a).

### Cactus Forest Drive Environmental Assessment — 2004

This plan includes actions to rehabilitate the 8.4-mile Cactus Forest Drive along Route 500 and Route 100 to improve deteriorating road edges and lateral cracking in the roadbed, primarily resulting from drainage control problems. Under this plan, the following actions were implemented: repaved the existing roadway along Route 500 and 100, reconfigured turnouts and the Javelina Picnic Area, improved road shoulders, established bicycle lanes on Route 500, improved roadside drainage, replaced two concrete box culverts, and improved drainage around stone walls constructed by the Civilian Conservation Corps (CCC).

### Fire Management Plan — 2007

The alternatives in *Saguaro's Fire Management Plan* (FMP) address the problems of fire hazard reduction while protecting, restoring, and maintaining the park's historic and natural systems. Prior to the plan, the existing program had been locally effective but had been unable to restore large areas of the park to natural, fire-influenced conditions, or to prevent more of the park from needing restoration. As a result, the incidence of catastrophic fire increased in recent decades. The plan considered the use of treatments to restore areas that have suffered the worst from vegetation encroachment, increasing forest density, and over protection. By focusing on the desired target forest conditions, the plan identifies activities for restoring these conditions and reducing the threats from unwanted wildland fires.

Under the FMP's preferred alternative, trails within the park would provide access for monitoring and control of wildland fires. Trails would also be used as boundaries for prescribed burns, anchor points for constructing fire lines, and fire lines. Some potential impacts that could result from implementation of the FMP include damage to trails, structures, and signs; closures of trails, roads, and campsites; the creation

of new access to areas of the park; and the development of social trails. To ensure the safety of firefighters and the general public, the following actions would be taken regardless of which of the FMP's alternative were implemented:

- Trails and roads providing access to mechanical fuel reduction projects, managed wildland fires, unwanted wildland fires, or prescribed fires would be closed if such fires and/or projects present unacceptably hazardous conditions to park visitors.
- Wilderness permits would not be issued for trailheads leading to hazardous areas.
- Roads and trails would remain closed until the hazard is abated.

Because use of the park's trails is so important to fire management and because such use could also lead to damage of the park's trails, actions expected under the FMP have been considered in the development of this plan's alternatives and cumulative impact analysis.

### Exotic Plant Management Plan — 2004

Saguaro National Park prepared an *Exotic Plant Management Plan* to identify and analyze alternatives for managing and controlling exotic plant species within the park. Active management of these plants promotes the ecosystem health of the park's diverse communities by maintaining or improving native forb, grass, shrub, tree, cactus, and succulent species and ultimately preventing the loss of wildlife habitat. The *Exotic Plant Management Plan's* preferred alternative includes the use of mechanical, cultural, chemical, low risk, and biological control techniques. Under the *Exotic Plant Management Plan*, 17 of the 80 exotic plant species found within the park were immediately treated because they were invasive, aggressive, and displaced native vegetation. The plan is ongoing; the remaining species may be treated in future years.

Alternatives defined under this trails plan (in chapter 2) consider the effects of encroaching urban development and increasing visitor use on invasive species within the context of the preferred alternative defined in the *Exotic Plant Management Plan.*

### Rincon Mountain Wilderness and Saguaro Wilderness Management Plan — 1992

The *Rincon Mountain Wilderness and Saguaro Wilderness Management Plan* outlined how the NPS would manage wilderness in the RMD of Saguaro National Park according to a "limits of acceptable change" approach. The plan governs use of the wilderness by all visitors and addresses recreation, trails, trailheads and access, signing, and administration and management. The plan divides the park and recreation areas into four opportunity classes, ranging from day use to more challenging backcountry use. Within these zones, management strategies and priorities are defined to "provide a variety of wilderness experiences" (NPS 1992).

### Annual Performance Plans

The park's annual performance plans describe what Saguaro National Park is doing to meet the goals defined in its *Strategic Plan*. If goals are not being met, actions can be identified in plans such as this trails plan / environmental assessment (plan/EA) to help achieve them.

Other planning documents for Saguaro National Park that relate specifically to trails planning and that were considered in the development of this plan are described below.

### Park Sign Plan

The park is in the process of developing a parkwide sign plan. The comprehensive plan will cover the frontcountry as well as backcountry areas and will be ordered in a logical and orderly fashion, once funds become available. The plan will include a sign condition assessment of all existing signs, a determination of needs, a removal plan, and a location plan. The comprehensive plan will also include guidelines for sign attributes such as size, material, color, text and other graphic content. The plan is expected to be completed by 2010.

## *National Park Service Mandates and Policies*

### Organic Act

The NPS *Organic Act* of 1916 directs the U.S. Department of the Interior and the NPS to manage units of the national park system "to conserve the scenery and the natural and historic objects and the wild life 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" (16 USC 1). The *Redwood National Park Expansion Act* of 1978 reiterates this mandate by stating that the NPS must conduct its actions in a manner that will ensure no "derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress" (16 USC 1 a-1).

### Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision-making

NPS *Director's Order 12* and its accompanying handbook (NPS 2001) lay the groundwork for how the NPS complies with the *National Environmental Policy Act* (NEPA). *Director's Order 12* and the handbook set forth a planning process for incorporating scientific and technical information and for establishing an administrative record for NPS projects.

*Director's Order 12* requires that impacts on park resources be analyzed in terms of their context, duration, and intensity. In order to help the public and decision makers understand the implications of impacts, they are described in terms of how long they would last, in conjunction with other impacts (cumulative impacts), and within context, based on an understanding and interpretation by resource professionals and specialists. *Director's Order 12* also requires that an analysis of impairment of park resources and values be made as part of the NEPA document.

### Natural Resource Reference Manual 77

The *Natural Resource Reference Manual 77*, which supersedes the 1991 *NPS 77: Natural Resource Management Guideline*, provides guidance for NPS employees responsible for managing, conserving, and protecting the natural resources found in national park system units.

### NPS *Management Policies 2006*

The NPS *Management Policies 2006* provides further interpretation and policy guidance relative to laws, proclamations, executive orders, regulations, and special directives. Some of the management policies that provide direction to this trails plan/EA are discussed below.

***Visitor Use.*** Enjoyment of park resources and values is part of the fundamental purpose of all parks. To provide for enjoyment of parks, the NPS will encourage visitor activities that

- are appropriate to the purpose for which the park was established
- are inspirational, educational, or healthful, and otherwise appropriate to the park environment
- will foster an understanding of, and appreciation for, park resources and values, or will promote enjoyment through a direction of, interaction with, or relation to park resources
- can be sustained without causing unacceptable impacts on park resources or values.

Many forms of recreation enjoyed by the public do not require a national park setting and are more appropriate to other venues. The NPS will therefore

- provide opportunities for forms of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources found in parks
- defer to local, state, and other federal agencies; private industry; and nongovernmental organizations to meet the broader spectrum of recreational needs and demands.

Unless mandated by statute, the NPS will not allow visitors to conduct activities that

- would impair park resources or values
- create an unsafe or unhealthful environment for other visitors or employees
- are contrary to the purposes for which the park was established
- unreasonably interfere with
    - the atmosphere of peace and tranquility or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the park
    - NPS interpretive, visitor service, administrative, or other activities
    - NPS concessioner or contractor operations or services
    - other existing, appropriate park uses.

Management controls must be imposed on all park uses to ensure that park resources and values are preserved and protected for the future. If and when a superintendent has a reasonable basis for believing that an ongoing or proposed public use would cause unacceptable impacts on park resources or values, the superintendent must make adjustments to the way the activity is conducted in order to eliminate the unacceptable impacts. If necessary, the superintendent may (1) temporarily or permanently close a specific area; (2) prohibit a particular use; or (3) otherwise place limitations on the use to ensure that impairment does not occur (NPS 2006f sec. 8.2).

***Carrying Capacity.*** Visitor carrying capacity is the type and level of visitor use that can be accommodated while sustaining the desired resource and visitor experience conditions in the park. The general management planning process determines the desired resource and visitor experience conditions that are the foundation for carrying capacity analysis and decision making (see page 10 for more information about Saguaro's GMP) (NPS 2006f sec. 8.2.1). For all zones, districts, or other logical management divisions within a park, superintendents identify visitor carrying capacities for managing public use (see appendix B). Superintendents also identify ways to monitor for, and address, unacceptable impacts on park resources and visitor experiences. The decision-making process is based on desired resource conditions and visitor experiences for the area, quality indicators and standards that define the desired resource conditions and visitor experiences, and other factors that lead to logical conclusions and the protection of park resources and values.

***Recreational Activities.*** Superintendents will consider a wide range of techniques in managing recreational use to avoid adverse impacts on park resources and values or on desired visitor experiences. Examples of appropriate techniques include visitor information and education programs, separation of conflicting uses by time or location, "hardening" sites, modifying maintenance practices, and permit and reservation systems. Superintendents may also impose local restrictions and public use limits and closures and may designate areas for a specific use or activity. Any restriction of appropriate recreational uses will be limited to what is necessary to protect park resources and values, to promote visitor safety and enjoyment, or to meet park management needs (NPS 2006f sec. 8.2.2).

***Visitor Safety.*** While recognizing that there are limitations on its capability to totally eliminate all hazards, the NPS and its concessioners, contractors, and cooperators will seek to provide a safe and healthful environment for visitors and employees. The service will work cooperatively with other federal, tribal, state, and local agencies, organizations, and individuals to carry out this responsibility. The NPS will strive to identify recognizable threats to the safety and health of persons, and to the protection of property, by applying nationally accepted codes, standards, engineering principles, and other NPS policies. When practicable, and consistent with congressionally designated purposes and mandates, the NPS will reduce or remove known hazards and apply other appropriate measures, including closures, guarding, signing, or other forms of education. In doing so, the NPS's preferred actions will be those that have the least impact on park resources and values (NPS 2006f sec. 8.2.5.1).

***Transportation Systems.*** The location, type, and design of transportation systems and their components (e.g., roads, bridges, trails, and parking areas) all strongly influence the quality of the visitor experience. These systems also affect, to a great degree, how and where park resources will be impacted. Before a decision is made to design, construct, expand, or upgrade access to or within a park, nonconstruction alternatives — such as distributing visitors to alternative locations — must be fully explored. If nonconstruction alternatives will not achieve satisfactory results, then a development solution may be pursued if the project (NPS 2006f sec. 9.2)

- is appropriate and necessary to meet park management needs or to provide for visitor use and enjoyment
- is designed with extreme care and sensitivity to the landscape through which it passes
- will not cause unacceptable adverse impacts on natural and cultural resources, and will minimize or mitigate those that cannot be avoided
- will not cause use in the areas it serves to exceed the areas' visitor carrying capacity
- will incorporate universal design principles to provide for accessibility for all people, including those with disabilities
- will take maximum advantage of interpretive opportunities and scenic values
- is based on a comprehensive and multidisciplinary approach that is fully consistent with the park's GMP.

***Hiking Trails.*** Trail design will vary to accommodate a wide range of users and will be appropriate to user patterns and site conditions (NPS 2006f sec. 9.2.2.2).

***Equestrian Trails.*** Equestrian trails and related support facilities may be provided when they are consistent with park objectives and when site conditions are suitable (NPS 2006f sec. 9.2.2.3).

***Bicycle Trails.*** The designation of bicycle routes, other than on park roads and in parking areas, requires a written determination that such use is consistent with the protection of a park's natural, cultural, scenic, and aesthetic values, safety considerations, and management objectives and that it will not disturb wildlife or other park resources (NPS 2006f sec. 9.2.2.4).

***Cultural Resource Management.*** The NPS will preserve and foster appreciation of the cultural resources in its custody, and it will demonstrate its respect for the people traditionally associated with those resources, through appropriate programs of research, planning, and stewardship (NPS 2006f sec. 5).

***Wilderness Preservation and Management.*** The NPS will manage wilderness areas 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. Management will include the protection of these areas, the preservation of their wilderness character, and the gathering and dissemination of information regarding their use and enjoyment as wilderness (NPS 2006f sec. 6.1).

All management decisions affecting wilderness must be consistent with the minimum requirement concept. This concept is a documented process used to determine whether administrative activities affecting wilderness resources or the visitor experience are necessary, and it also determines how to minimize impacts. The minimum requirement concept will be applied as a two-step process that determines

- whether the proposed management action is appropriate or necessary for administration of the area as wilderness and does not pose a significant impact on wilderness resources and character
- the techniques and types of equipment needed to ensure that impact on wilderness resources and character is minimized (NPS 2006f sec. 6.3.5).

The NPS will encourage and facilitate those uses of wilderness that are in keeping with the definitions and purposes of wilderness and that do not degrade wilderness resources and character. Appropriate restrictions may be imposed on any authorized activity in the interest of preserving wilderness character and resources or to ensure public safety (NPS 2006f sec. 6.4).

### Related Laws, Regulating Policies, and Plans

In addition to NPS-specific mandates and policies described above, the NPS is governed by other laws and regulations, described in appendix F.

## *Scoping*

Scoping is a process to identify the resources that may be affected by a project proposal and to explore the possible alternative ways of achieving the proposal while minimizing impacts. External scoping has been an extensive and ongoing effort to involve and gather input from interested and affected groups and agencies since the inception of the planning process.

### Internal Scoping

Internal scoping was conducted by an interdisciplinary team consisting of Saguaro National Park staff, planning professionals from the NPS, and the Intermountain Support Office in Denver. Internal scoping meetings were conducted at Saguaro National Park in November, 2005. Staff from Saguaro National Park, as well as individuals from the U.S. Forest Service (USFS) and the Sonoran Institute, attended. Team members discussed the purpose and need for the project; important resources; values, issues, and concerns; past, present, and reasonably foreseeable actions; ongoing maintenance activities; and possible mitigation measures of the proposed action.

### Cooperating Agencies

During internal scoping, the USFS and the Bureau of Land Management (BLM), as well as local agencies, were identified as potential cooperating agencies for this plan. Under NEPA, a cooperating agency is “any Federal agency other than a lead agency [in this case, the NPS] which has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal…Under request

of the lead agency, any other Federal agency which has jurisdiction by law shall be a cooperating agency." In addition, a state or local agency of similar qualifications may also become a cooperating agency. However, agencies asked to become cooperating agencies are not required to do so.

Agencies that could affect, or be affected by, this plan include those with jurisdiction in areas immediately surrounding Saguaro National Park. The RMD is bordered to the north, east, and southeast by Coronado National Forest, which is administered by the USFS. The TMD is bordered to the south by Tucson Mountain County Park, which is administered by Pima County.

Saguaro National Park contacted the USFS, BLM, Arizona State Land Department (which administers Arizona State Trust Lands), Catalina State Park, Colossal Cave Mountain Park (a Pima County park), and Pima County to become cooperating agencies. All of these agencies have signed agreements to be cooperating agencies.

## External Scoping — Public Involvement

### Saguaro National Park Trails Workgroup Committee

The NPS wanted to hear from a wide variety of trail users and capture the public's thoughts on ideas for new trails as well as on issues and other concerns about existing trails. To address this need, the NPS contracted with the Rincon Institute, a nonprofit conservation organization founded in 1991 to help protect the natural resources of Saguaro National Park East and adjoining lands. The Rincon Institute was tasked with helping to assemble a trails workgroup and to facilitate and manage 10 trails workgroup meetings. The purpose of the trails workgroup was solely to exchange views, information, or ideas relating to trails management and implementation of a trails plan.

The Rincon Institute contacted all of the various hiking, equestrian, cycling, environmental, and neighborhood groups associated with the park and asked the interested groups to work within their particular interest to self-select two members to represent them in the trails workgroup.

The 12 seats on the workgroup consisted of an equal representation of hiking, equestrian, cycling, running, and environmental interests. The workgroup also included two "at large" members. The Rincon Institute final report, dated August 28, 2006, which summarizes participants, agendas, and results, is included in appendix C.

### Newsletters and Public Meetings

In September 2005, a newsletter which introduced a general overview of the trails planning process was mailed to interested and affected parties; in this document, the GMP was described as the umbrella and foundation for the trails planning vision.

In February 2006, the second trails newsletter (General Management Plan Preferred Alternative / Trails Plan Scoping - Newsletter Four) was mailed to approximately 3,200 interested and affected parties on the GMP and trails plan mailing lists. This newsletter included an update of trails planning associated with the GMP and began the trails planning scoping process by soliciting comments on trails' issues.

On June 15, 2007, the park announced that three alternatives for trail systems in each district were available for review and comment on the NPS Planning, Environment, and Public Comment (PEPC) website until July 28. Letters were mailed to approximately 3,200 interested and affected parties, with a website address indicating where to find the alternatives' maps, other maps and materials, and instructions on how to comment.

Also during this public review period, the NPS conducted three open house meetings on the trails' alternatives in the Tucson metro area (June 26–28, 2007). Participants on the mailing lists were sent notice of the meetings, and a meeting notice was posted in local newspapers. The public was invited to talk to NPS staff regarding proposed actions on trails, as depicted on maps and various handouts, and

were given the opportunity to express or leave written comments at the meeting, mail in comments at a later date, or comment online.

- The June 26 meeting was held at Magee Middle School and was attended by 100 individuals who were largely interested in the RMD trails.
- The June 27 meeting was held at Picture Rocks Intermediate School and was attended by 26 individuals who were largely interested in TMD trails.
- The June 28 meeting was held at the Pima County Parks and Recreation Natural Resources Building and was attended by 31 individuals.

The NPS received 253 individual pieces of correspondence, form and non-form, which contained a total of 590 comments on the trails plan alternatives. One petition was received which contained 40 signatures.

- Form Letters – Fifty-five form letters were received. A form letter is defined as a letter containing content that is largely identical to other letters. In general, there was one form letter that focused on trails in the RMD and which stated general opposition to trail closures, suggesting an "Alternative C" instead of alternatives A, B, or the no action alternative. A few variations of another letter for the TMD were received, suggesting the no action alternative be adjusted to show other existing trails.
- Non-Form Letters – Non-form letters include mailed individual or personalized letters, comment forms received at open houses, comment forms that were sent to the NPS through the mail, and letters or comments received on the PEPC website. The NPS received 198 non-form letters during the comment period. Comments from these letters were incorporated into the comment analysis. Many letters contained multiple comments on a variety of topics, while some letters focused on one trail or aspect of the planning process.

The following summarizes comments received from the June 2007 mailings and open house meetings:

- **Agreement with Proposed Alternatives**. A majority of individuals expressed agreement with one of the alternatives presented (alternative A, B, or no action). Some were in general agreement with an alternative but offered variations to the alternative such as an access point or a trail. For the RMD, a majority of those who preferred alternative A were in favor of the proposed Arizona Trail route through the park or other newly proposed trails. Many of those who preferred alternative B liked the greater number of trails the alternative offered compared to alternative A. In the TMD, a majority of commenters preferred alternative B because they felt it would provide more access and trail options than alternative A. Some preferred the no action alternative because they preferred the status quo.
- **Don't Close Trails**. Comments on trail closures focused mainly on the Cactus Forest area of the RMD. Many individuals were opposed to closing trails. Many individuals did not want any trails to be eliminated and suggested that the NPS open more trails. Others opposed the closure of a certain trail or trails. Some felt that redundant trails still offered a different visitor experience or opportunity and should be kept open. Many felt that trail closures would lead to greater congestion on the trails that would remain open.
- **New Access Points, Trails, or Trail Connections**. Some respondents wanted more access points into the park than currently exist. Many comments focused on the location of additional access points. Many commenters suggested new ideas for trails or trail connections. A majority of comments expressed agreement with a proposed trail or connection in alternative A or B. Others suggested specific new trail connections and access points.
- **Visitor Conflicts and Safety**. Some commenters were opposed to mountain bicycling because of resource issues and visitor conflicts. Some felt that mountain biking should not be an allowable use in national parks. Some were opposed to horses on hiking trails or thought that horses should

be eliminated from the park due to resource, visitor experience, and sanitation issues. Others felt that more trails should be hiking only, or that horses should be restricted to washes only. Others felt that riders should be required to clean up after their horses. Many equestrians and some hikers were opposed to the existing rock steps found in the Cactus Forest Planning Area of the RMD. Many thought that the steps were a safety hazard. Some also felt that they are incompatible with wilderness character. Other safety issues included parking and pull out concerns at some access points, or the need to park and cross busy roads to access a trailhead.

- **Maintenance/Management Issues**. Many individuals commented on the need to maintain or close trails that had extensive maintenance issues. Some suggested that trails be rerouted. Other issues included safety of parking pullouts, safety issues associated with the lack of parking facilities, the need for restroom facilities at trailheads, and the need for adequate trail signs. Some individuals suggested that all users should be required to pay a fee to use trails so that they could be adequately maintained.
- **Close Trails**. Some individuals were opposed to the creation of social and connector trails that were not designed with any standards, and they thought that they should be closed. Some wanted more closures than what was proposed in either alternative A or B. Others cited the need for trail closures because of resource concerns or continuing maintenance problems associated with poor design. Many respondents suggested very specific trail closures or closure of certain trail segments.
- **Natural and Cultural Resource Issues**. Many respondents thought that trails should be closed or rerouted because of erosion, poor design, or lack of trail design. Some suggested trails be closed or rerouted to avoid sensitive resources. Some thought there should be fewer trails in some areas to protect sensitive natural and cultural resources or maintain a wilderness experience. Others cited a specific use (e.g., horse use, mountain bike use) as the principle cause of erosion. A few individuals were concerned that some specific trails, both existing and proposed, would result in increased impacts on archeological sites.
- **Other Visitor Experience/Opportunity Issues**. Many were in favor of the proposed ADA trails. Some felt that more ADA trails were necessary. Many individuals mentioned the desire to walk or ride trails that included loops instead of out and back routes. Several hikers suggested retaining some smaller loops for those who did not want to hike for hours. Others wanted to retain wilderness character and the feeling of solitude and natural quiet that wilderness should offer. Others felt that all washes should remain in the trail system and suggested that wildlife is not threatened by human presence. Some wanted more opportunities for ‘hiker only’ trails.
- **Use Volunteers**. Many respondents suggested the use of volunteers to repair trails that need maintenance. A majority of the comments associated with volunteer help were associated with the RMD, where volunteer help was suggested as a way to repair eroded trails in lieu of closure. Some suggested instituting a volunteer program to assist with trail maintenance year round.
- **Consider a New Alternative**. Some respondents suggested a new alternative for the RMD. A majority of the form letters received suggested that the NPS should examine “alternative C” as presented by an organized group. The NPS considered this alternative and analyzed the impacts of the proposed actions in this trails plan.

The alternatives, including the preferred, were constructed with careful consideration of public comments and the objectives of this trails plan. The alternatives include a number of different ideas presented by the public during public comment periods.

Comprehensive Trails Plan Newsletter Three (Newsletter #3), dated February 2008, was mailed to approximately 3,200 individuals on the Saguaro National Park GMP and trails plan mailing list. This

newsletter provided a summary of public comments on the alternatives. The public was provided a 30-day comment period. Newsletter #3 received 48 comments.

## *Appropriate Use*

Sections 1.4 and 1.5 of NPS *Management Policies 2006* direct that the NPS must ensure that park uses that are allowed would not cause impairment of, or unacceptable impacts on, park resources and values. A new form of park use may be allowed within a park only after a determination has been made in the professional judgment of the park manager that it would not result in unacceptable impacts.

Section 8.1.2 of NPS *Management Policies 2006*, Process for Determining Appropriate Uses, provides evaluation factors for determining appropriate uses. All proposals for park uses are evaluated for

- consistency with applicable laws, executive orders, regulations, and policies
- consistency with existing plans for public use and resource management
- actual and potential effects on park resources and values
- total costs to the NPS
- whether the public interest will be served.

Park managers must continually monitor all park uses to prevent unanticipated and unacceptable impacts. If unanticipated and unacceptable impacts emerge, the park manager must engage in a thoughtful, deliberate process to further manage or constrain the use or discontinue it. More information on the definition of unacceptable impacts as cited in §1.4.7.1 of NPS *Management Policies 2006* can be found in "Chapter 4: Environmental Consequences."

This plan's alternatives have been developed so that appropriate access would be provided for visitors to enjoy the park and learn about the Sonoran Desert and its associated habitat as well as to ensure that unacceptable impacts on park resources and values would not occur. Basic facilities for visitor safety and services would be provided, and visitation would be managed and redirected, when necessary, to protect sensitive resources and minimize impacts on resources.

## *Scope of the Environmental Assessment*

### Issues and Impact Topics Retained for Detailed Analysis

NPS *Director's Order 12, Conservation Planning, Environmental Impact Analysis, and Decision-making* (2001), lists mandatory topics that must be considered in a NEPA plan. The impact topics and their associated issues listed below are described in more detail in chapter 3 and impacts on each topic are analyzed in chapter 4. If no issues are expected based on available information, then the topic was eliminated from further discussion, as described on page 31.

#### Vegetation

The NPS strives to preserve and restore native plant communities contained in national park units while minimizing human impacts on native plants, animals, communities, and ecosystems, as well as the processes that sustain them (NPS 2006f).

The park contains an abundance of diverse plant life and riparian areas that are necessary for the preservation of saguaro cacti (the presence of which is a contributing factor to the park's significance, as described on page 8). Resources such as the saguaro forest, riparian areas, and other habitat for wildlife and threatened and endangered species are particularly sensitive to visitor use (NPS 2005b). As noted under the "Soils" topic, off-trail hiking, and use of social trails in the park, extend the amount of trampling beyond designated trails, directly impacting vegetation. Soil compaction in these areas inhibits the ability of vegetation to regrow.

Practically any recreational use that involves contact with the terrain has the potential for direct and indirect impacts on biotic communities (NPS 2002a). Ground cover vegetation is profoundly impacted by visitor use, particularly as a result of trampling, of which the direct effects are usually detrimental to plants. Impacts caused by trampling plants (being killed outright or losing their ability to reproduce) are compounded by the problems of growing and reproducing in compacted soils. Trampling leads to a reduction in the amount of vegetation, which can, in turn, result in a decline of species richness or diversity. Species differ greatly in their resistance to impact (Hammitt et al. 1998).

Many of the species most resistant to trampling are nonnative (exotic) and often thrive in disturbed areas where native species have difficulty growing (Hammitt et al. 1998). Increasing nearby urban development and visitor use have the potential to increase nonnative invasive species in the park, for nonnative plants are spread by seeds, which can enter the park on hiking boots, bicycles, motor vehicles, construction equipment, or horses. Horse manure can also contain nonnative seeds (NPS 2005b).

Of the nonnative invasive plant species found in the Tucson area, two perennial bunch grasses are of specific concern within Saguaro National Park: buffelgrass (*Pennisetum ciliare*) and fountain grass (*Pennisetum setaceum*). Buffelgrass has been observed and eradicated along the Cactus Forest Trail, and both grasses have been observed along the Cactus Forest Loop Drive. These plants impact ecosystem structure by crowding out native plants and altering ecosystem function, such as nutrient cycling, hydrology, and most importantly, fire regime. These grasses can fuel larger and more frequent wildfires (NPS 2004a, 2004b).

### Wildlife

As with native plant communities, the NPS strives to preserve and restore native animals contained in national park units while minimizing human impacts on native plants, animals, communities, and ecosystems, and the processes that sustain them (NPS 2001).

Wildlife resources at Saguaro National Park are diverse, reflecting the park's ecologically strategic location. Overall, the park supports a unique and diverse assemblage of thousands of invertebrates and more than 325 vertebrates, including about 70 mammals, 200 birds, 50 reptiles, and 8 amphibians (NPS 2002a).

Animals are susceptible to recreational disturbance. Recreation affects wildlife either directly (disturbance or harassment) or indirectly (alteration of habitat) (Hammitt et al. 1998). The behavior of people when recreating can have a profound influence on wildlife responses. The presence alone of people has been shown to cause impacts on some species, regardless of the type of activity or the number of people involved. Predictability of people’s behavior is an important factor affecting wildlife response. For example, intensity of hiking use is known to influence animal movement, feeding habitats, and habitat occupation. Species that are less tolerant of recreational disturbance will be replaced by those better adapted to the new environmental conditions. When species displacement occurs, often the replaced environment is of poorer quality or has more competing elements than the original area, resulting in a more drastic change for wildlife than recreational harassment and habitat modification (Hammitt et al. 1998).

The density and location of trails in the park can influence wildlife habitat viability and habitat connections. The park plays a considerable role in protecting a core area of high quality habitat. Saguaro’s proximity to other large public lands makes protection of wildlife corridors important. In addition, increasing urbanization in the region greatly influences wildlife habitat and connections (NPS 2005b).

### Threatened, Endangered, Candidate Species and Species of Special Concern

The 1973 *Endangered Species Act* (ESA) requires an examination of impacts on all federally listed threatened or endangered species. NPS policy also requires examination of the impacts on federal

candidate species, as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species (NPS 2006f).

Resources such as saguaro forest, riparian areas, and other habitats for threatened and endangered species are particularly sensitive to visitor use. When habitat is reduced, so is the number of threatened and endangered species. Threatened and endangered animals that rely on particular habitats are affected when those habitats are damaged (many of the issues related to wildlife, discussed above, also affect threatened and endangered animals).

Lesser long-nose bat (*Leptonycteris curasoae yerbabuena*) and Mexican spotted owl (*Strix occidentalis lucida*) are threatened and endangered species within the area. Lesser long-nosed bat migrations coincide with the availability of the pollen and fruit of columnar cactus (cardon and saguaros) and the nectar and pollen of blooming agaves in the summer and fall. Mexican spotted owls are located in higher elevations of the RMD and have designated protected activity centers (PACs). The yellow-billed cuckoo (*Coccyzus americanus*) is a federal candidate species that is transient in the park and may breed within the park. The Gila topminnow (*Poeciliopsis occidentalis occidentalis*) is federally endangered and has been extirpated from the park. However, stream habitat for the Gila topminnow has been identified for potential additional management action.

### Soils

According to NPS *Management Policies 2006*, the NPS will strive to understand and preserve the soil resources of park units and to prevent, to the greatest extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources.

Saguaro's soils range from coarse rock and talus, in the mountainous areas, to increasingly fine alluvial soils in the lower elevations. Most soils are shallow, well-drained, and have very low water-holding capacity. Collectively, these and other characteristics make the park's soils very susceptible to erosion (NPS 2002a). In desert areas, any kind of recreational use rapidly eliminates the soils' surface organic layer, which is very thin and patchy (if present at all) in such climates. As the organic matter is so sparse to begin with, such losses can have severe impacts on soils (Hammitt et al. 1998).

Soil erosion and loss have occurred to varying degrees on park trails. Some soils, particularly on steeper sections, are more susceptible to erosion than other sections (NPS 2002a). Off-trail hiking and use of social trails in the park extend the amount of trampling (and thus compaction and erosion) beyond designated trails, increasing impacts on soils. Poorly designed and unmanaged trails can also increase erosion. After soils are loosened by visitor use, they are more susceptible to removal by wind and water associated with storm events (NPS 2002a).

### Archeological Resources and Historic Sites and Structures

NPS *Management Policies 2006* directs parks to preserve archeological resources and take proactive measures to protect them. The *National Historic Preservation Act* (NHPA), as amended in 1992 (16 USC 470 et seq.); the NEPA of 1969 (42 USC 4321 et seq.); NPS *Director's Order 28, Cultural Resource Management Guideline* (1997), NPS *Management Policies 2006* (NPS 2006f), and *Director's Order 12, Conservation Planning, Environmental Impact Analysis, and Decision-making* (2001) require the consideration of impacts on historic structures and buildings listed in or eligible for listing in the National Register of Historic Places (NRHP).

Saguaro's cultural resources are being lost due to vandalism and theft (NPS 2005b). The amount of use and location of trails can affect the park's ability to protect cultural resources, as Saguaro has a high density of cultural resource sites. In addition, all of the cultural resources listed below are susceptible to ground disturbance related to trail construction and maintenance activities.

***Archeological Resources*** — Saguaro's prehistoric resources are primarily low visibility artifact scatters that represent campsites, quarries, agricultural sites, and villages. Other prehistoric sites include rock art sites, rock shelters, and sites with bedrock grinding features (NPS 2003).

***Historic Sites and Structures*** —The historic period sites at Saguaro National Park include Manning Camp, the Freeman Homestead, ranches, lime kilns, the CCC-constructed sites, and historic period trash scatters (NPS 2003).

## Wilderness Values

NPS *Management Policies 2006* states that planning for wilderness resources must ensure that the wilderness character [as defined under the *Wilderness Act* of 1964 is preserved.

Approximately 78% of the park is designated wilderness. A wilderness is an "area where the earth and its community of life are untrammeled by man…" An area of wilderness retains "its primeval character and influence" and "is protected and managed so as to preserve its natural conditions." A wilderness "generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable" and provides "outstanding opportunities for solitude or a primitive and unconfined type of recreation."

Certain areas of the park do not currently meet this description of wilderness. The presence of rapidly expanding social trails does not give the park an appearance of a wilderness that is "untrammeled by man." Social trails and trails widened by erosion also do not appear to be "affected primarily by the forces of nature." Crowded conditions deprive visitors of experiencing "outstanding opportunities for solitude or a primitive and unconfined type of recreation." Vandalism and damage to vegetation, which in turn impact wildlife, also degrade the park's "natural conditions." Furthermore, difficulty in maintaining existing trails prevents park staff from "protecting and managing [wilderness] so as to preserve its natural conditions."

## Visitor Use and Experience

NPS *Management Policies 2006* notes that enjoyment of park resources and values is part of the fundamental purpose of all parks. However, management controls must be imposed on park uses to ensure that park resources and values are preserved and protected for the future.

Popular recreational activities in both districts include auto touring, bird watching, hiking, nature walks, and wildlife viewing. The park also offers ranger-guided nature walks, self-guided field trips, and a number of education and outreach programs. According to the park's year 2001 strategic planning results, 99% of park visitors reported being satisfied with their visit to the park (NPS 2002a). However, as visitation continues to rise, so does congestion and the ability to enjoy solitude and a pristine wilderness experience. The public has expressed concern that overuse of the park and increasing urbanization could threaten the park's qualities of solitude, quiet, and naturalness (NPS 2006b). High densities of visitors are concentrated in certain areas of the park, and commercial tour organizations (guided hikes, horseback tours) also bring

large groups into the park. The wide variety of recreation activities available on park trails (such as hiking, mountain biking, and equestrian use) can lead to impacts from noise, as well as user conflicts, which can diminish the overall visitor experience.

### Park Management and Operations

NPS *Management Policies 2006* calls for parks to be managed holistically 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.

Saguaro National Park law enforcement and maintenance staff provide trail repair, maintenance, and visitor safety services for more than 185 miles of trail. However, the park currently does not have sufficient staff to perform these activities. Out of the nine full-time facility management staff assigned to the park, one subject-to-furlough supervisor is dedicated to operation and maintenance of the trail systems for Saguaro and four other Southern Arizona parks. The remaining eight personnel are split between the two districts and are assigned to maintenance and operations of the parks buildings, roads, and utility systems. There are many seasonal employees recruited for trail repair and maintenance. Most funding for trail activities is not provided by the park, but rather is obtained through sources within and outside of the NPS, typically in the form of grants. Mountain bike interest groups have also periodically performed volunteer trail maintenance on the Cactus Forest Trail. Nine law enforcement rangers patrol both districts of the park. NPS rangers make informal contacts with visitors to discuss safety measures (adequate water, protection from heat, etc.), and proper trail etiquette. Theft, vandalism, and poaching are ongoing problems (NPS 2002a; B. Riley, Saguaro National Park, pers. comm. 2006).

The park also relies heavily on volunteers to complete a variety of tasks including trail maintenance, restoration and patrols; natural resource management for exotic plants; animal surveys and monitoring; archeological sites monitoring; visitor center staffing; and provision of interpretive programs.

The actions proposed under this plan would require additional staff resources for trail construction, repair, training, maintenance, patrol, and enforcement.

## 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 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.

General definitions for *Negligible*, *Minor*, *Moderate* and *Major* effects are

- *Negligible*: the action would result in a change 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
- *Moderate*: the action would result in a clearly detectable change
- *Major*: the action would result in the permanent loss or there would be highly noticeable, widespread changes

The following issues were eliminated from further analysis for the reasons stated below.

**Air Quality** — Section 118 of the 1963 *Clean Air Act* (42 U.S.C. 7401 et seq.) requires a park unit to meet all federal, state, and local air pollution standards. Further, the *Clean Air Act* provides that the federal land manager has an affirmative responsibility to protect air quality related values (including visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse pollution impacts. NPS *Management Policies 2006* directs parks to seek the best air quality possible in

order to "preserve natural resources and systems; preserve cultural resources; and sustain visitor enjoyment, human health, and scenic vistas."

Construction activities related to trail development and maintenance could impact air quality to the extent that motorized equipment is used and dust is generated. Because approximately 78% of Saguaro National Park is wilderness, the park would be required to follow minimum tool requirements in those areas, which would preclude the use of motorized equipment. Any use of motorized equipment in other areas of the park for purposes of this plan is expected to contribute no more than negligible impacts on air quality.

**Water Quality** — Section 404 of the *Clean Water Act* authorizes the U.S. Army Corps of Engineers (USACE) to prohibit or regulate, through a permitting process, discharge of dredged or fill material or excavation within U.S. waters**.** NPS *Management Policies 2006* requires protection of water quality consistent with the *Clean Water Act*. Watersheds in Saguaro National Park are generally small with first-, second-, and third-order drainages (Mott 1997). Erosion control methods would be used during ground-disturbing construction, which would minimize the amount of sediment that reaches creeks and pools. Trail construction activities could have adverse negligible impacts on the park's water quality.

Water quality could be affected by stormwater runoff as a result of parking lot construction, where contaminants, such as grease, oil, and antifreeze, could be flushed into waterways by rainfall events. Impervious areas, such as paved parking, hasten the movement of stormwater runoff across the surface, increasing flood occurrences and stream/wash bank erosion. With implementation of stormwater management standardized Best Management Practices (BMPs) for the construction of parking lots, the mitigated impacts would be minimal. The likelihood of major spills — once lots are constructed — is also minimal. Thus, construction related impacts, with strong mitigation measures in place, would be adverse and negligible to minor for the large parking lots

**Wetlands and Floodplains —** *Executive Order 11990, "Protection of Wetlands,"* requires federal agencies to avoid, where possible, adversely impacting wetlands. Proposed actions that have the potential to adversely impact wetlands must be addressed in a statement of findings.

*Executive Order 11988, "Floodplain Management,"* requires federal agencies to take action to reduce the risk of flood loss; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains.

No wetlands or 100-year or 500-year floodplains occur within the park (NPS 2004a). Therefore, no impacts on wetlands or floodplains are expected under any of the alternatives.

**Museum Collections** — According to *Director's Order 24, Museum Collections*, the NPS requires the consideration of impacts on museum collections (historic artifacts, natural specimens, and archival and manuscript material), and provides further policy guidance, standards, and requirements for preserving, protecting, documenting, and providing access to, and use of, NPS museum collections. Most of the park's museum collection consists of archives that contain records of more than 70 years of park operations. None of the proposed actions would affect museum collections. Therefore, this topic was dismissed from further analysis.

**Prime and Unique Farmlands —** In August 1980, the Council on Environmental Quality (CEQ) directed that federal agencies must assess the effects of their actions on farmland soils classified as prime or unique by the U.S. Department of Agriculture's Natural Resource Conservation Service (NRCS). 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.

No prime or unique farmlands exist at Saguaro National Park. Therefore, this topic was dismissed from further analysis.

**Indian Trust Resources —** *Secretarial Order 3175* requires that any anticipated impacts on Indian trust resources from a proposed project or action by the U.S. Department of the Interior agencies be explicitly addressed in environmental documents.

No Indian trust resources exist at Saguaro National Park. The lands comprising the park are not held in trust by the secretary of the interior for the benefit of Indians due to their status as Indians. Therefore, Indian trust resources were dismissed as an impact topic.

**Indian Sacred Sites —** This plan would not restrict access to ceremonial use of Indian sacred sites for ceremonial use.

**Socioeconomic Impacts —** The proposed action would neither change local and regional land use nor appreciably impact local business or other agencies. Communities near the park could experience benefits from increased tourism if improved trails and access leads to more visitation. However, increased visitation as a result of implementing this plan is expected to have negligible impacts on socioeconomics. Therefore, this topic was dismissed from further analysis.

**Environmental Justice —** According to the U.S. Environmental Protection Agency (EPA), environmental justice is the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

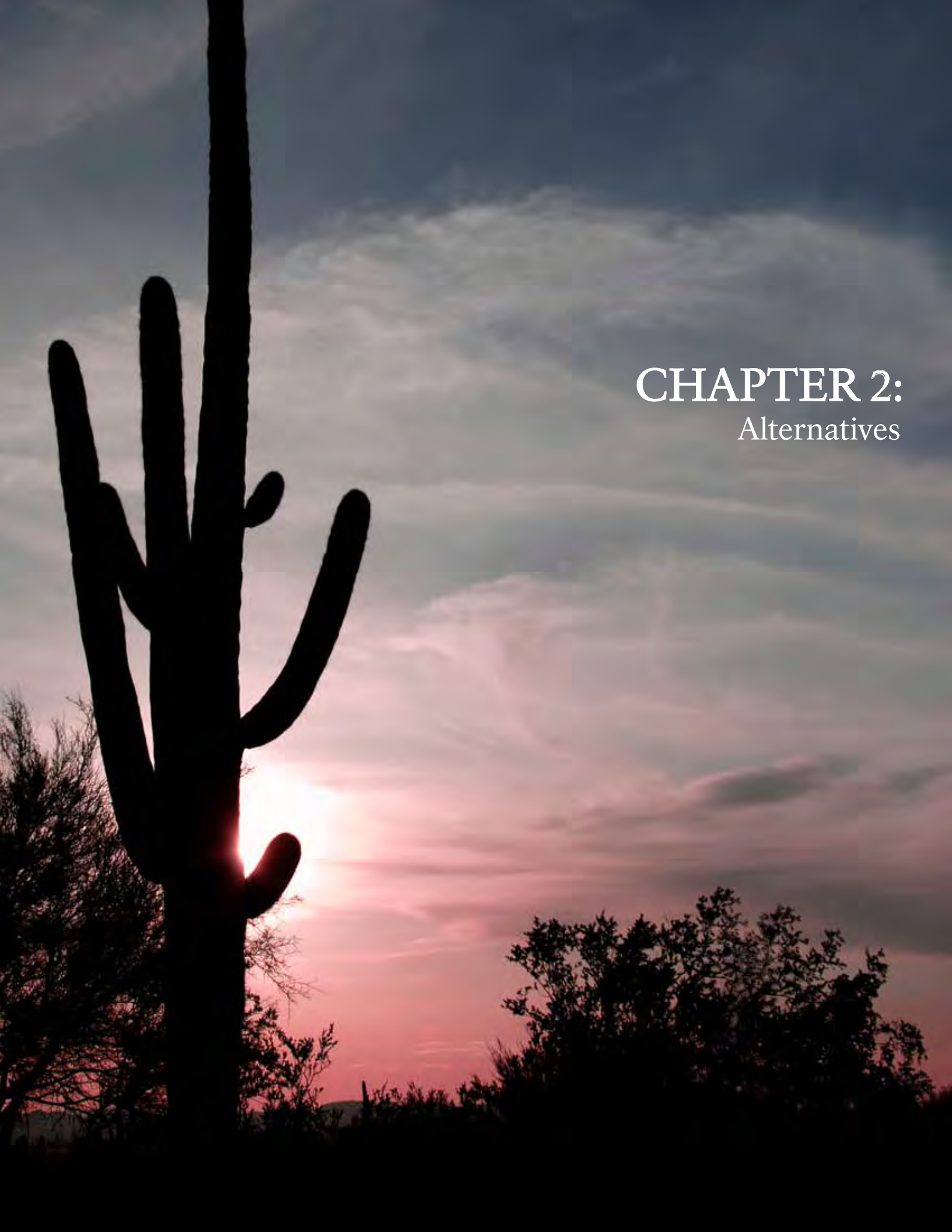
Presidential Executive Order 12898, "General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing the disproportionately high and/or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities.

The proposed action would not have disproportionate health or environmental effects on minorities or low-income populations or communities as defined in the EPA's *Draft Environmental Justice Guidance* (July 1996). Therefore, environmental justice was dismissed as an impact topic.

**Paleontological Resources —** None of the actions proposed under this plan would affect paleontological resources within Saguaro National Park.

**Geohazards —** No known geohazards exist within Saguaro National Park.

**Energy Resources —** The action alternatives do not call for major development. Whenever possible, the park would use energy conservation technologies and renewable energy sources. Consequently, the alternatives would have negligible effects on energy consumption compared to the current conditions. Therefore, energy resources were dismissed as an impact topic.



# CHAPTER 2:
## Alternatives

# Chapter 2: Alternatives

This chapter describes the various actions that could be implemented for Saguaro National Park trails. The *National Environmental Policy Act* (NEPA) requires federal agencies to explore a range of reasonable alternatives and to analyze what impacts the alternatives could have on the human environment, which NEPA defines as the natural and physical environment and the relationship of people with that environment. The analysis of impacts is presented in "Chapter 4: Environmental Consequences" and is summarized in table 3 near the end of this chapter.

As prescribed by the NEPA regulations at 40 CFR 1502.14, the alternatives under consideration must include a "No Action" alternative. The No Action alternative in this document is the continuation of current management; no major changes would be made to current management actions.

## *Guidance from the 2008 General Management Plan*

The draft *General Management Plan* (GMP) provides the following direction for trails in both units of the park:

### Parkwide Trails

- 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 this 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 this comprehensive trails plan.
- The need for trail realignments to protect resources would be evaluated.
- Sustainability would be considered in developing/improving the trail system.

### 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 figure 12).
- Opportunities for developing bicycle 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 *Americans with Disabilities Act* (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 Civilian Conservation Corps (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.
- The Natural Zone within the Cactus Forest Loop Drive would be considered to allow for exploration of additional ADA accessible nature trails.

## Prescriptive Management Zoning

The GMP established prescriptive management zoning for all areas of the park. Management zoning prescribes desired conditions for appropriate resource conditions, visitor experiences, and facilities for different areas of the park; all prescriptions must be within the scope of, and consistent with, the park's mission. A description of prescriptive management zones and their user capacities are in appendix B.

### User Capacity Standards for Trails

The National Park Service (NPS) 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. The GMP specifies both biological and social user capacity standards for trail use for each of the management zones in the plan. Trails would be monitored to evaluate trail use density and resource condition and to ensure that trail standards are not being exceeded. If trails are found to be near or at capacity, management action would be taken to mitigate potential impacts. See appendix B for user capacity standards for trails.

### Trails Prioritization

Trails work would continue to be prioritized according to need. The NPS utilizes the "Facility Management Software System (FMSS)" database to manage all built assets, such as trails. Saguaro National Park has fully incorporated this system into its day-to-day and long-term maintenance planning, including prioritization of trails work. Each trail is given an Asset Priority Index (API) number, attained by answering a series of questions. In addition, a cost replacement value is determined for each trail based upon a national standard. The trail program supervisor uses this information to rank and prioritize trail work, then develops work orders for needed repairs and maintenance. This data is also used by park staff and regional program managers to prioritize work and assign funding, when available, for trails at the park.

## *Actions Common to All Action Alternatives*

Under all action alternatives, the NPS would strive to protect natural and cultural resources; provide for a variety of trail recreational experiences; ensure reasonable access to a safe, well-designed, and sustainable trail system; and ensure that trails are properly signed and that they meet established trail standards. All NPS action alternatives include criteria for evaluating what washes may be suitable for human use.

All NPS action alternatives examine what existing trails might be sustainable and could be part of an efficient and accessible trail system as well as what social routes should be considered for formal designation as a trail. The action alternatives differ in their trail recommendations with regards to location, type, and density of trails because each alternative presents a different trails concept and includes ideas presented by the public during public comment periods. The preferred alternative was constructed with careful consideration of public comments on alternatives A and B (both districts), alternative C (RMD), and the objectives of this trails plan.

Existing trails, and new trails developed under the action alternatives, would permit use by hikers and equestrians unless otherwise noted as hiker only or multiuse, which would also permit use of bicycles.

The following actions would occur regardless of what action alternative may be implemented as the approved plan.

### Education

NPS staff and volunteers would educate park users at the beginning of the implementation of this plan.

### Americans with Disabilities Act Trails

ADA challenge trails would be composed of dirt. Non-challenge ADA trails would be composed of a hardened surface to be concrete or asphalt.

### Washes

Visitors would not be able to use washes that do not meet the suitability criteria for being designated as a trail. Suitability criteria for being designated a trail have been developed and applied to washes in the expansion area of the Tucson Mountain District (TMD) and all areas within the Rincon Mountain District (RMD) (see appendix D). Suitability criteria address concerns that have arisen due to visitors' use of wash areas, which traverse both districts of the park and serve as valuable riparian corridors that offer food and cover for many wildlife species. For instance, social trails that have developed adjacent to some wash beds have caused adverse impacts on soils and vegetation, such as the disappearance of vegetation in smaller washes. The resulting degraded habitat conditions may be causing wildlife to avoid these areas.

The alternatives maps show washes that are already designated as trails in the TMD and those that are proposed as wash trails in both districts.

### Trail Reroutes / Reroute Restoration

A number of trail sections throughout the existing trail system would be identified for minor reroutes and included in a yearly programmatic work plan. Reroutes would occur to improve poor design and eliminate resource concerns. Appropriate mitigation measures and other guidelines identified in the work plan would be applied to minimize impacts on resources. Reroutes would be in compliance with the NEPA, the *Endangered Species Act* (ESA), the *National Historic Preservation Act* (NHPA), and other related laws and policies. An NPS staff interdisciplinary team would review the yearly programmatic work plan for consistency and compliance with applicable laws, regulations, policies, and mitigation measures before any work commences. Restoration guidelines are included in this plan in appendix E.

### Partnerships

The park would continue to work with neighboring land agencies to maintain and improve on a range of trail recreation opportunities, such as maintaining shared parking facilities, constructing and maintaining trails, and securing access points across neighboring lands, where appropriate. Proposed actions involving partners differ slightly between action alternatives, depending on the trail type and location, facilities, and other actions.

### Use of Volunteers

Volunteers would continue to be utilized for trail work at Saguaro National Park. Currently the park utilizes both group and individual volunteers.

Trail Stewards - Saguaro National Park Trail Staff would begin a "Trail Steward" program. Trail Stewards would be required to go through trail maintenance training before working on trails at Saguaro. After the training, sections of trails would be assigned to the volunteers. They would be asked to perform basic tasks to help improve Saguaro's trail system. Both individual and group volunteers would be assigned segments of trail for which they would be responsible. Volunteers would report on trail conditions and perform basic maintenance tasks.

Tasks include the following:

- inspecting and evaluating trails at least twice yearly
- reporting problems requiring assistance immediately
- clearing and brushing
- removing litter
- implementing trail improvements (often with help from others)
- controlling for erosion, wet areas, minor relocations
- reporting to supervisor twice yearly on work done and problems

## Parking Lots

New, official access point locations were carefully considered and chosen after addressing the following questions/conditions:

- How close is the proposed access point to an existing access point or trailhead?
- What are the safety conditions surrounding the access point (road crossings, sight distance, and traffic levels)?
- Is a trail currently in use that the access point is serving or would a new trail need to be built?
- Does it connect with the Regional trail system?
- Does it enhance the visitor experience?
- Does it reduce parallel and duplicative trails?
- Does it serve the general public?

If the proposed access point did not meet safety conditions, did not access through neighboring public land, or if there were other access points nearby, the location was given lower consideration.

Broadway and Speedway boulevards parking lot options in the RMD were selected using these factors and public comment considerations. Parking lot locations were delineated and a range of parking spaces are suggested to allow for environmental analysis of the specific sites. Parking lots are proposed in the following locations:

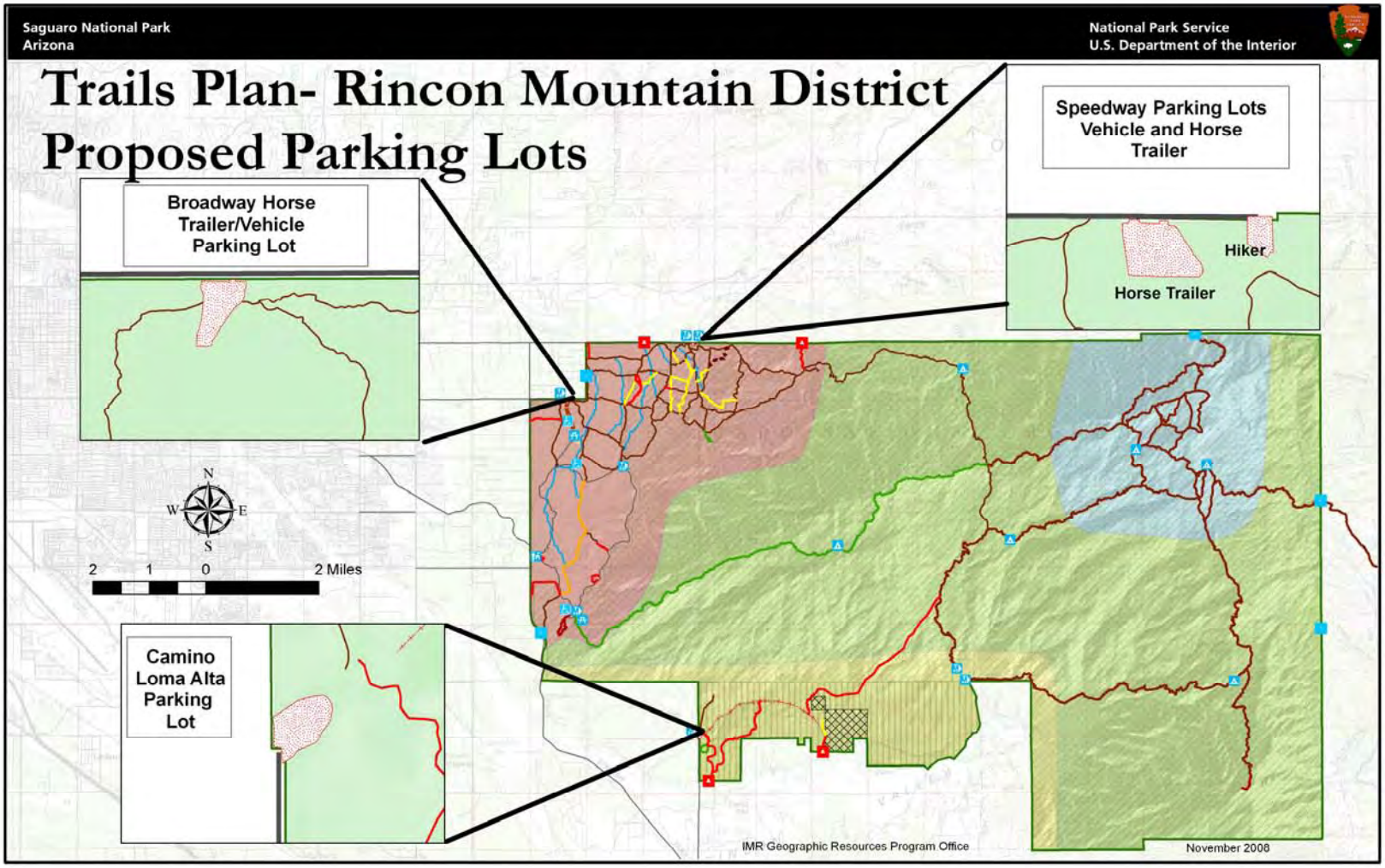
### *Rincon Mountain District*

Parking in this district would consist of paved parking for cars, gravel for horse trailers, a vault toilet, shade ramada, concrete curbing and sidewalks, and other amenities such as signs and trash receptacles at the following locations (figure 2).

- Speedway at the Douglas Springs / Wildhorse trailhead
- Broadway at the Cactus Forest trailhead and the end of the road
- Camino Loma Alta at the Loma Alta trailhead

On Broadway Boulevard, two parking lots would be constructed — one for hikers, one for equestrians. Hikers would park at the northern end of the Mica View Trail. A new parking lot for equestrians would be built and new connections with Shantz and Pink Hill trails would be made at the eastern terminus of Broadway Boulevard.

**Figure 2: Rincon Mountain District Proposed Parking Lots**



### *Tucson Mountain District*

Both Golden Gate parking lots would consist of paved parking for cars, gravel for horse trailers, a vault toilet, shade ramada, concrete curbing and sidewalks, and other amenities, such as signs and trash receptacles. The following are the locations of proposed parking lots:

- North end of Golden Gate Trail at Picture Rocks Road
- South end of Golden Gate Trail at the Sendero-Esperanza trailhead (expand existing parking)
- CCC Camp trailhead on Rudasill Road, which would be paved for cars and one recreation vehicle (RV) (no horse trailer parking) with concrete curbing and sidewalks; no toilet would be provided. Signs would be provided in accordance with the *Sign Plan*.
- Belmont, at the north end of the Pipeline Trail, which would be paved when the road is paved and would provide for cars; two horse trailer spaces would also be provided; no toilet, no ramada would be provided (figure 3). Signs would be provided in accordance with the *Sign Plan.*

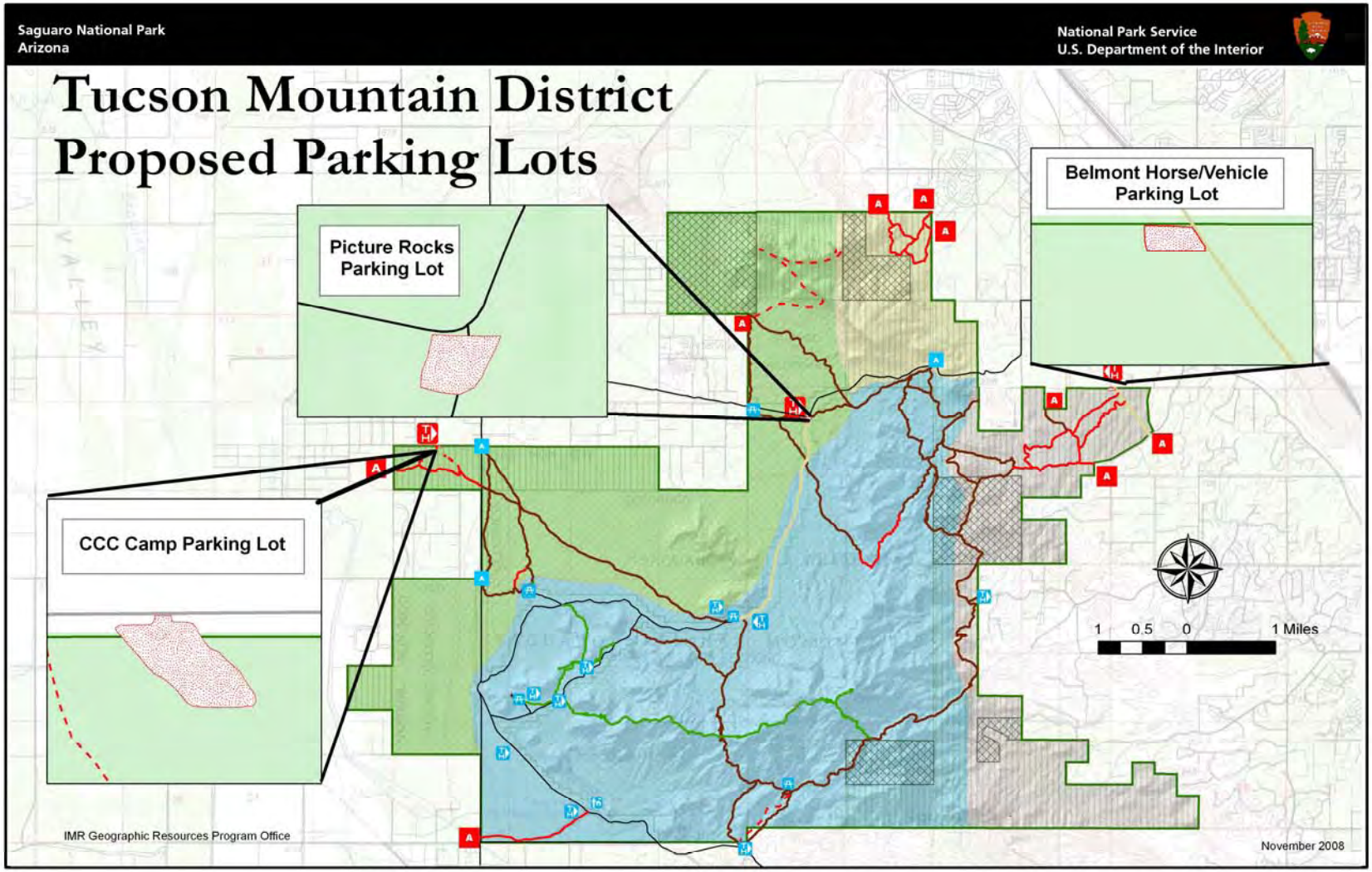
## Mitigation Measures

The following mitigation measures would be used to minimize impacts on natural resources in general and threatened and endangered species in particular:

### Overall

- The park would implement low impact, wilderness-compatible techniques and tools (i.e., hand tools) where applicable and feasible on all trail maintenance and rehabilitation work within the designated wilderness. Power tools might be used when appropriate in non-wilderness areas.
- Out-sloping would be used whenever possible. This technique, in which workers shovel and scrape the berm back onto the trail, is the quietest and fastest way to repair a trail and produces the fewest resource impacts.
- Removal of, or impact on, native vegetation adjacent to trails would be minimized as much as possible.
- Impacted bare areas (i.e., old trail sections that have been realigned, impacted areas along the trail corridor) would be revegetated.
- Rehabilitation/revegetation of disturbed sites would require notification/consultation with the park's restoration ecologist.
- A park biologist would provide trail crews with an orientation/briefing that would appraise them of and sensitize them to threatened and endangered species and other relevant natural resource issues.
- Care would be taken not to disturb any other sensitive wildlife species (reptiles, migratory birds, raptors, or bats) found nesting, hibernating, estivating, or otherwise living in or immediately nearby the worksites.
- Resource Management personnel would be notified/consulted when wildlife, must be disturbed or handled. Staff would assist with handling and moving Gila monsters, snakes, and other wildlife, when necessary.
- Sonoran desert tortoise, a sensitive species, shelters in burrows, which are usually found on rocky slopes below boulders and rocks. Thus, holes and crevices large enough to house an adult tortoise (more than 20 centimeters wide at the opening) would not be disturbed. Resource management staff should be consulted regarding the discovery or relocation of any tortoise.
- Efforts would be made to reduce the potential for nonnative animals, such as bullfrogs, crayfish and goldfish, to escape into the park in order to prevent them from becoming a threat to native species.

**Figure 3: Tucson Mountain District Proposed Parking Lots**



Above 4,000 feet elevation (Mexican spotted owl (MSO); lesser long-nosed bat/agave)

- The trail crew would be advised of the sensitivity of the local threatened and endangered species and their habitats and behave accordingly (working quietly on site and minimizing time in or near MSO Protected Activity Centers (PACs) and peregrine eyries as well as minimizing impacts on agave).
- Work in MSO PACS would be minimized to the extent possible during the MSO breeding season (March 1 – August 31).
- When it is necessary to work within PACS, no habitat features (e.g., large trees, dense canopy, multistoried vegetation, snags and large logs) for the MSO would be disturbed; all work would be on the existing trail corridor with only minimal re-routing or widening of the trail, and crew sizes would be kept to a minimum (ideally 3–5 people).
- When the breeding status of MSOs is unknown, it would be assumed that the owls are breeding and appropriate mitigations implemented.
- All work would be completed with hand tools (no motorized/power tools).
- The trail reroutes would have minimal impact on the environment, especially with regard to cutting trees (especially above 6,000 feet) and impacting agave plants (4,000 feet to 6,000 feet).

The following mitigation measures would be used to minimize impacts on cultural resources.

- Cultural Resources would be considered during all phases of planning for the comprehensive trails plan. Many of the current trails in the park pass through or near historic and archeological sites. The greatest risk to these sites is ground-disturbing activities, such as those associated with trail construction, maintenance, or closure. Although none of the alternatives propose construction of new trails on or adjacent to known cultural resources, 106 NHPA compliance would be completed on a project by project basis, especially for maintenance and closure projects.
- Although there is no surface evidence of archeological resources in areas of proposed construction, clearance to proceed is recommended with the condition that if concealed archeological resources are encountered during project activities, all necessary steps will be taken to protect them and to notify the park consulting archeologist immediately.
- Adverse effects on the eligible sites should be avoided if at all possible. If not, then the NPS shall consult with the State Historic Preservation Officer (SHPO) and other consulting parties, including Indian tribes, to develop and evaluate alternatives or modifications to the undertaking that could avoid, minimize, or mitigate adverse effects on historic properties. The NPS shall notify the Advisory Council on Historic Preservation (ACHP) of the adverse effect finding and invite the ACHP to participate in the consultation when: (1) the NPS wants the ACHP to participate; (2) the undertaking has an adverse effect upon a National Historic Landmark; or (3) a programmatic agreement (PA) should be prepared, as specified in 36 CFR 800.14(b).

**Table 1: Trail Mileage for all Alternatives**

| RMD | No Action | Alternative A | Alternative B | Alternative C | Preferred Alt. |
|---|---|---|---|---|---|
| Retained Hiker | 16.3 | 16.3 | 16.3 | 16.3 | 16.3 |
| Retained Horse/Hiker | 100.0 | 88.6 | 88.7 | 87.6 | 90.1 |
| Retained Multiuse | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| Use Change to Hiker | | | 4.5 | | 0.6 |
| Use Change to Multiuse | | 2.8 | | 2.8 | 2.8 |
| Remove Horse/Hiker | | -7.2 | -4.3 | -7.1 | -4.0 |
| Add Hiker | | 0.4 | 0.4 | 0.4 | 1.1 |
| Add Horse/Hiker | | 5.2 | 3.9 | 8.4 | 7.3 |
| Add Multiuse | | 0.3 | | 1.2 | 0.3 |
| Add Horse/Hiker-Wash | | 4.5 | 5.7 | 10.2 | 10.2 |
| Add Hiker- Wash | | | | | 0.2 |
| Add- ADA | | | | | 0.8 |
| Total Trail Miles | 118.8 | 108.9 | 112 | 112.1 | 117.8 |
| Total Trail Miles w/ Washes | | 113.4 | 117.7 | 122.3 | 128.2 |
| Added Trail Miles | | 5.9 | 4.3 | 10.0 | 9.5 |
| Added Trail Miles-Wash | | 4.5 | 5.7 | 10.2 | 10.4 |
| Removed Trail Miles | | -7.2 | -4.3 | -7.1 | -4.0 |
| Net Gain/Loss in Mileage | | 3.2 | 5.7 | 13.1 | 15.9 |
| **TMD** | **No Action** | **Alternative A** | **Alternative B** | **Preferred Alt.** | |
| Retained Hiker | 10.3 | 10.3 | 10.3 | 8.4 | |
| Retained Horse/Hiker | 35.9 | 35.0 | 35.9 | 35.0 | |
| Retained Multiuse | | | | | |
| Use Change to Hiker | | | | 0.9 | |
| Use Change to Multiuse | | | | | |
| Use Change to Horse/Hiker | | | | 1.9 | |
| Remove Horse/Hiker | | -0.9 | | | |
| Add Hiker | | | 0.7 | | |
| Add Horse/Hiker | | 11.8 | 14.4 | 11.4 | |
| Add Multiuse | | 2.6 | 3.3 | 3.3 | |
| Add Horse/Hiker-Wash | | | | | |
| Add Hiker- Wash | | | | | |
| Add- ADA | | 1.0 | 0.3 | 0.3 | |
| Total Trail Miles | 46.2 | 59.8 | 64.9 | 61.2 | |
| Added Trail Miles | | 15.4 | 18.7 | 15.0 | |
| Added Trail Miles-Wash | | | | | |
| Removed Trail Miles | | -0.9 | | | |
| Net Gain/Loss in Mileage | | 14.5 | 18.7 | 15.0 | |

## *Descriptions of Planning Areas*

In order to facilitate the planning and analysis of trails, trails systems, resources, access points, and potential parking lots, the park staff divided each of the park units into smaller, definable sub-units, or "planning areas." The following section describes each of these planning areas.

## Rincon Mountain District

### Manning Camp Planning Area

Description: The Manning Camp trail system is a network of trails that surrounds Mica Mountain and the historic Manning Cabin area (see figure 4). It is primarily accessed by the Douglas Springs Trail and trailhead, or from the Italian Springs trailhead access on U.S. Forest Service (USFS) land north of the park, or from the Miller Creek and Turkey Creeks trails from USFS land in Happy Valley, east of the park. All trails are in designated wilderness.

GMP Prescriptions / Management Zones: All trails are in the Primitive Zone (a portion of the Douglas Spring Trail is in the Semi-primitive Zone).

Trails Classifications: All trails in this area are class C.

### Southern Boundary Planning Area

Description: A majority of this area was added to the park as part of congressional legislation passed in 1991 (see figure 4). In 2005, the area was evaluated for its suitability for wilderness designation. A large inholding of state and private land exists immediately east of the Hope Camp Trail. Most of the area to the south is private land.

GMP Prescriptions / Management Zones: The Hope Camp Trail is in a corridor of the Natural Zone. South of this corridor, land is zoned Semi-primitive, and north of the corridor, land is zoned Primitive. An area of land encompassing Box Canyon is zoned Sensitive.

Trails Classifications: The Natural Zone allows trails A, B, and C. The Semi-primitive Zone allows trail types B and C. The Primitive Zone allows trail type C.

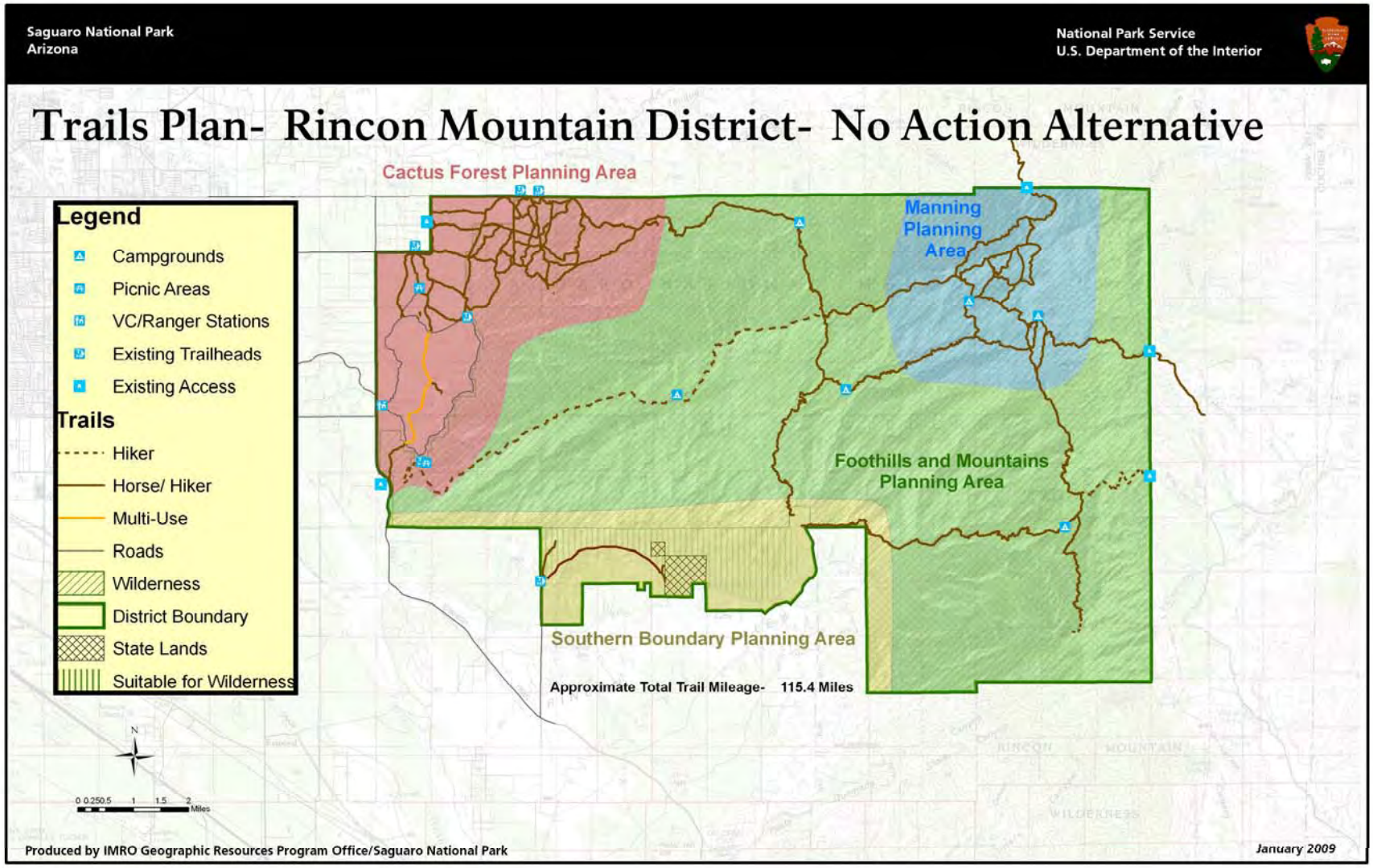
### Cactus Forest Planning Area

Description: This area includes the Cactus Forest trail system immediately south of Broadway and Speedway boulevards and trails in and immediately surrounding the Cactus Forest Loop Drive (see figure 4). The trails are accessed by the Broadway, Wildhorse, and Speedway trailheads, the Cactus Forest Loop Drive, and the Irvington access.

GMP Prescriptions / Management Zones: The Cactus Forest Trail network accessed by Broadway and Speedway trailheads, including the area along the western boundary and the visitor center, is predominantly zoned Semi-primitive. Some of the easternmost trails, such as Carillo and Three Tanks, and a portion of the Douglas Springs Trail are zoned Primitive. The area within the Cactus Forest Loop Drive is zoned Natural.

Trails Classifications: The Natural Zone allows trails A, B, and C. The Semi-primitive Zone allows trail types B and C. The Primitive Zone allows trail type C.

**Figure 4: Rincon Mountain District – No Action Alternative**



### Foothills and Mountains Planning Area

Description: This area is sparsely covered by trails in the interior of the RMD (see figure 4). Major trails in this area include the Douglas Spring and Tanque Verde Ridge trails. Many of the trails access backcountry camping areas, including Happy Valley, Grass Shack, Juniper Basin, and Douglas Springs camps.

GMP Prescriptions / Management Zones: Trails in this area are zoned Primitive.

Trails Classifications: Trail type C.

## Tucson Mountain District

### East Boundary Planning Area

Description: This area includes lands along the eastern boundary of the TMD, including a majority of the expansion lands added to the unit in 1994 (see figure 5).

GMP Prescriptions / Management Zones: A variety of land ownership, including state, county, and private lands, exist in this area. Land under NPS ownership is zoned either Primitive or Semi-primitive.

Trails Classifications: Trail types B and C.

### Northeast Corner Planning Area

Description: This area in the Northeast Corner of the TMD is south and west of the Continental

Reserve Subdivision, east of Panther and Safford Peaks, and roughly north of Picture Rocks Road (see figure 5).

GMP Prescriptions / Management Zones: A large portion of this area is State of Arizona land. Land under NPS ownership is zoned Primitive.

Trails Classifications: Trail type C.

### Northwest Planning Area

Description: This area makes up most of the TMD's northern and western boundaries. It is bounded by Golden Gate Road and trail on the south (see figure 5).

GMP Prescriptions / Management Zones: A majority of the area is zoned Primitive, except for the area that surrounds the CCC camp, which is zoned Natural.

Trails Classifications: Trail types A and B.

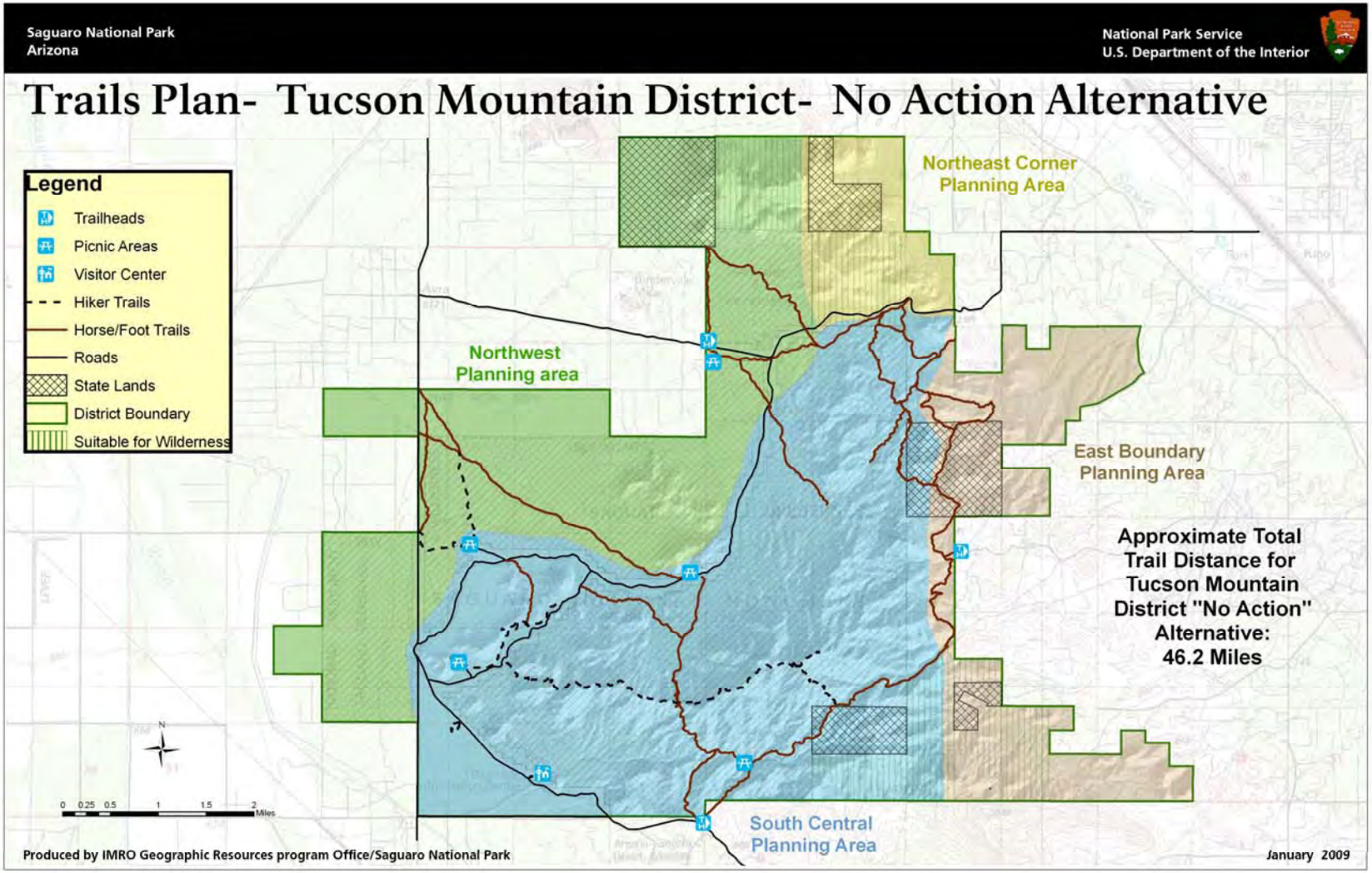
### South Central Planning Area

Description: This is the largest area in the TMD and includes lands south of the Golden Gate Road and trail to the southern boundary (see figure 5).

GMP Prescriptions / Management Zones: A majority of the area is zoned Primitive. Land within the Bajada Scenic Loop and around the Mam-A-Gah Picnic Area is zoned Semi-primitive.

Trails Classifications: Trail types B and C.

**Figure 5: Tucson Mountain District – No Action Alternative**



## *No Action Alternative (Continuation of Existing Conditions and Management Programs)*

The no action alternative represents current conditions and is also a baseline for comparison of the action alternatives. Under this alternative, the park would continue to manage trails without a comprehensive plan for a balanced and sustainable trail system. No new trails would be designed and constructed, and trails in both units would not be evaluated for sustainable conditions and suitability. Social trails would not be converted to official trails, and a majority of them would eventually be closed and restored. Some reroutes may occur under a categorical exclusion; however, unsustainable trails in poor condition may eventually be closed without a suitability analysis to determine how they contribute to the overall trail system.

Park staff would continue to piecemeal construction of some of the more extensive and badly needed trail reroutes on some of the more sustainable trails in the system. Design standards, mitigation measures, and other guiding principles of a comprehensive plan would not be available. Environmental compliance would be done on a project-by-project basis.

## Rincon Mountain District

The current trails configuration in the RMD would remain (figure 4). No new mountain bike or ADA trail opportunities would be provided other than those trails that currently provide such access.

Existing social trails would not be evaluated for suitability for inclusion in the trail system and would eventually be closed. All unauthorized social trails would eventually be closed due to resource damage.

### Manning Camp Planning Area

There would be no change to trail design or trail use in the Manning Camp Planning Area. No new trails would be constructed, and trail maintenance activities would continue as under current conditions. Under the GMP, use of Manning Cabin would be reduced, and wilderness values in this area would be improved.

### Southern Boundary Planning Area

Same as the Manning Camp Planning Aarea. In addition, newer expansion lands in the southern section of the district would not be evaluated for trail opportunities.

### Arizona Trail

A new route connecting to the Arizona Trail would not be considered. Creation of unofficial social trails to connect to the Arizona Trail could occur, and they would not be properly designed with appropriate mitigation and protection measures. Opportunities for partnership and volunteer support or funding related to connecting with the Arizona Trail would not occur.

### Cactus Forest Planning Area

Many redundant, poorly located, and maintenance-dependent trails in the Cactus Forest Planning Area would remain. The widened and braided trails in this area that have resulted from poor design and high use would not be redesigned or rerouted, and the problems would continue. Many of the washes in this area are unofficially used as trails, leading to development of social trails as described under “Washes” below. All trails in this area permit hiking and horse use, and one allows mountain bike use. Such use would continue.

### Foothills and Mountains Planning Area

There would be no change to trail design or trail use in the Foothills and Mountains Planning Area. No new trails would be constructed, and trail maintenance activities would continue as under current conditions.

### Access Points and Trailheads

Formal parking for vehicles and horse vehicles/trailers would not be constructed at the Cactus Forest Planning Area. Visitors would continue to park cars, trucks and horse trailers along the sides of Speedway and Broadway boulevards to access the Wildhorse, Broadway, and Douglas Springs trailheads. Hikers and equestrians would continue to unload, prepare for trail use, and cross along these roads, creating undesirable safety situations.

No additional parking or trailhead improvements would occur at other locations in this district.

### Washes

Many of the washes in the RMD, which are located predominantly in the Cactus Forest Planning Area, would not be evaluated for their suitability for use as trails. Their function as important vegetation and wildlife corridors would not be assessed, and social trails would continue to develop adjacent to wash banks. All washes in this district would be closed to trail use because none have been, or would be, officially designated as trails.

## Tucson Mountain District

The current configuration of formal trails in the TMD would remain, and existing social trails would not be evaluated for suitability for inclusion in the trail system and would eventually be closed (figure 5). Comprehensive guidance for trail design and mitigation would not be developed. All unauthorized social trails would eventually be closed due to resource damage. Off-trail travel restrictions would apply under 4,500 feet as determined in the GMP. There would continue to be a lack of mountain bike and ADA trail opportunities in the district. The park is working on completing a boundary fence around this district to help prevent illegal off-road travel into the park.

### Northeast Corner Planning Area

No official trails exist in this area of the park, and none would be developed. A permit currently is, and would continue to be, required to access state land. The park has a conservation easement within this section; no trails are planned for that section.

### Northwest Planning Area

No official trails lead to the CCC area in the Northwest Planning Area although several social trails exist there and would eventually be closed. No new trails would be formalized or created to access the CCC area. No trail access would be provided to Panther or Safford Peaks. Official trails exist that provide access to sections of this area that have been identified as suitable for wilderness; however, no new trails would be developed to access this section.

### East Boundary Planning Area

Few official trails exist in the East Boundary Planning Area, and no new trails would be developed. Trail use would be limited to the Camino del Cerro trailhead. A trail to a windmill, which is a popular visitor destination, would remain. No official trail access to other popular destinations or the proposed wilderness area in the lower section would be provided.

### South Central Planning Area

No new trail connections in the South Central Planning Area would be developed. Golden Gate Road would be closed to motor vehicle access and would be converted to a multiuse trail and maintained as a trail. To the west, trails and picnic areas would remain closed to horse use. The park would continue maintaining existing trails and structures.

### Access Points and Trailheads

Existing access points and trailheads would remain. Any access points that are not officially designated as such would be closed. No new access points or trailheads would be assigned or constructed. Access points and trailheads would not be formalized, and trail use designations (e.g., multiuse, hiker only) would remain the same. Cars and horse trailers would continue to park along roads until the access points were closed. In the Northwest Planning Area, no trailheads exist that are suitable for horse trailers, and none would be developed. In the South Central Planning Area, parking would continue to be provided at the Kings Canyon trailhead, which is on county land and not administered by the NPS. The park would work with the county on relocating this access slightly north of the current location. Pima County would site this to improve sight distance.

### Washes

Some washes in the TMD have already been designated as trails; that would not change under the No Action alternative (figure 5). No other washes in this district would be evaluated for, or officially designated as, trails. The function of washes as important vegetation and wildlife corridors would not be assessed, and social trails would continue to develop adjacent to wash banks.

## *Rincon Mountain District – Alternative A*

This alternative focuses on providing reasonable access and a variety of trail recreational experiences while minimizing redundancy in some high density areas. Both existing and new trails were evaluated in terms of access to attraction sites, variety in terrain, vegetation type, user type, popularity, safe travel, and resource protection and sustainability. Some trails in high density areas were eliminated if they did not meet these criteria. Linkages with USFS and Pima County lands have been included to ensure continuity of appropriate trail recreation on neighboring lands.

### Manning Camp Planning Area

Actions under alternative A would be the same as the no action alternative with the exception that the Bonita Trail would be removed and restored to natural conditions (figure 6).

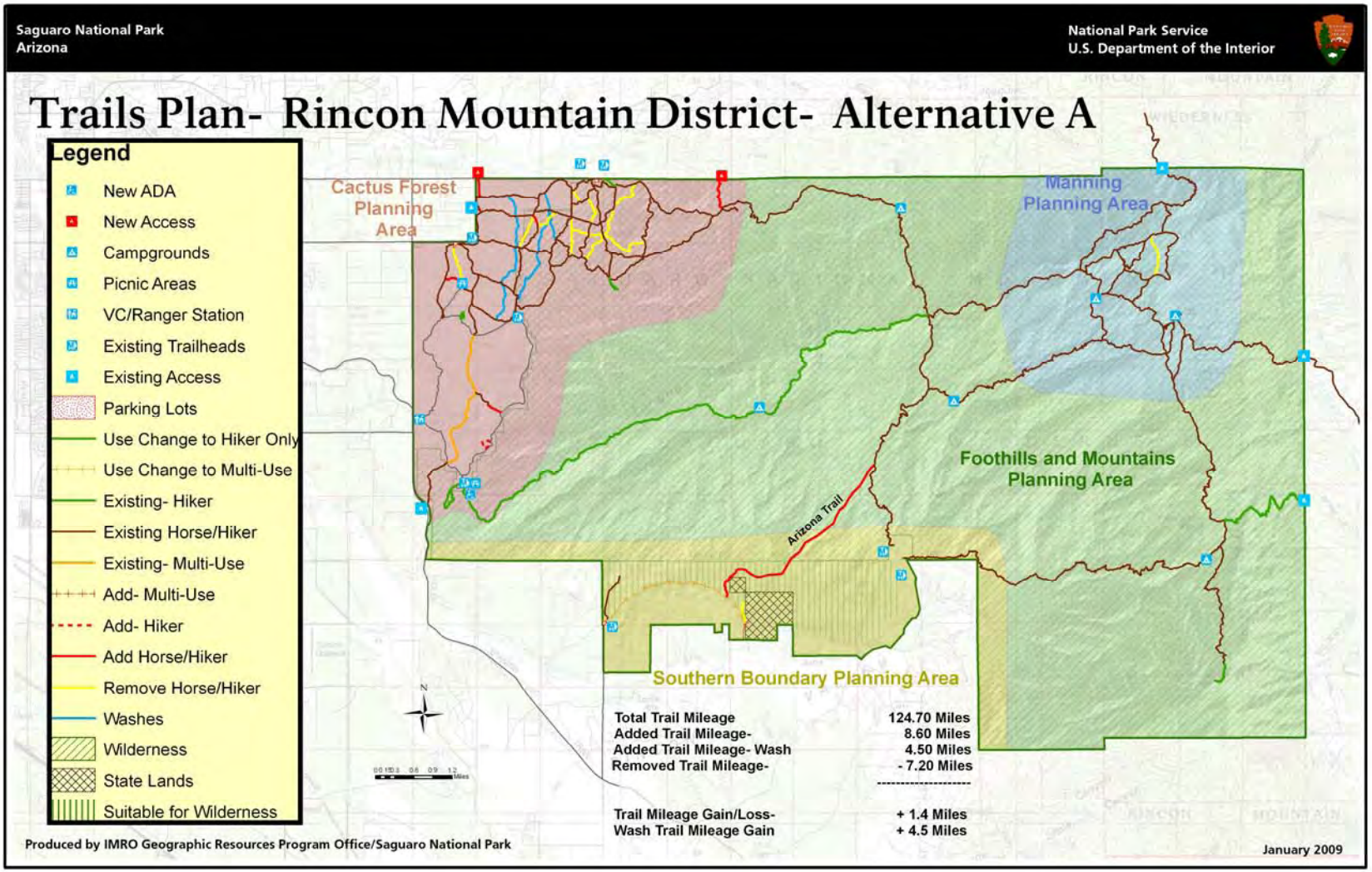
### Southern Boundary Planning Area

Under alternative A, the Hope Camp Trail would be converted to a multiuse trail to allow bicycle, horse, and hiker use, and the eastern portion of the trail would be extended to the southern boundary of the park and include a new access point at the boundary. The North Hope Camp Trail would be removed and restored to natural conditions.

### Arizona Trail

The Arizona Trail would connect to the Hope Camp Trail and continue approximately 4.2 miles northeast to a connection with the Manning Camp Trail.

**Figure 6: Rincon Mountain District – Alternative A**



### Cactus Forest Planning Area

Under alternative A, in the Cactus Forest Loop area, the Lime Falls Trail that spurs off of the Cactus Forest Trail would be extended east to connect to the eastern portion of the Cactus Forest Loop Drive.

In the Cactus Forest trail system that is accessed by Speedway and Broadway boulevards, the following trails would be removed and restored to natural conditions:

- Mica View (Broadway Trailhead to the Mica View Picnic Area)
- Loma Verde (Wentworth to Pink Hill)
- Kennedy (from Squeeze Pen to Carrillo)
- Palo Verde
- Bajada Vista
- Freight Wagon (Creosote to Wentworth)
- Wagon Spur
- Garwood (Wentworth to Carillo)
- Wentworth (Douglas Springs to Garwood)
- Reroute Saguaro north of Pink Hill and rename to Loma Verde

Three trails would be added to this area: The Ernie's Falls Trail would be constructed to connect the Douglas Spring Trail to existing trails on USFS land. A new trail originating at the proposed Wentworth access point would connect with the Shantz Trail, and a trail would be constructed from the Shantz Trail to the Mica View Picnic Area.

### Foothills and Mountains Planning Area

Actions under alternative A would be the same as the no action alternative.

### Access Points and Trailheads

Along the northern boundary, a new access point at the Ernie's Falls Trail would allow travel between USFS and NPS lands. Along the western boundary, the Old Spanish Trail (Irvington) access would be relocated approximately 0.25 mile north of the existing location to a location that would connect near the Shurban Wash and allow for greater sight distance along Old Spanish Trail.

An access point would be located in the Southern Boundary at the eastern terminus of the Hope Camp Trail.

### Washes

Under alternative A, the Loma Verde, Monument, and Deer Valley washes would be designated as trails. All other washes would be closed to trail use.

## *Rincon Mountain District – Alternative B*

This alternative focuses on retaining sustainable trails in some of the more popular or well-established areas of the park, while protecting natural and cultural resources in other areas of the park. Some high density areas may have more trail miles than alternative A (table 1, trail mileage placeholder). To offset resource and maintenance concerns associated with higher densities, some multiuse trails that have sustainability issues have been converted to single-use trails.

## Manning Camp Planning Area

Actions under alternative B would be the same as the no action alternative.

## Southern Boundary Planning Area

Two trails would be constructed from a new access point in the Coyote Creek area. One trail would connect with the Hope Camp / Ridge View trailhead near the proposed Rocking K Education Center, and another trail would connect at the midway point along the Hope Camp Trail. As in alternative A, under alternative B, a new access point would be designated at the eastern terminus of the Hope Camp Trail, along the NPS southern boundary. Bicycles would be prohibited on the Hope Camp Trail, and the North Hope Camp Trail would remain (figure 7).

## Arizona Trail

The Arizona Trail would follow the alignment of the existing Tanque Verde Ridge Trail, originating at the Tanque Verde Ridge trailhead at the Javelina Picnic Area. Horses would be prohibited.

## Cactus Forest Planning Area

In the Cactus Forest Loop Road area, a hiker only trail would be located around Javelina Rocks and accessed from the Cactus Forest Loop Drive.

In the Cactus Forest trail system accessed by Speedway and Broadway boulevards, the following trails would be removed and restored to natural conditions:

- Loma Verde (Wentworth to Pink Hill)
- Palo Verde (Shantz to Creosote)
- Kennedy (Squeeze Pen to Carillo)
- Wentworth (Garwood to Douglas Springs)
- Bajada Vista
- Reroute Saguaro north of Pink Hill and rename to Loma Verde

The Carillo and Garwood trails would be converted to hiker only trails.

As in alternative A, under alternative B, the Ernie's Falls Trail would be constructed to connect the Douglas Spring Trail to existing trails on USFS land.

## Foothills and Mountains Planning Area

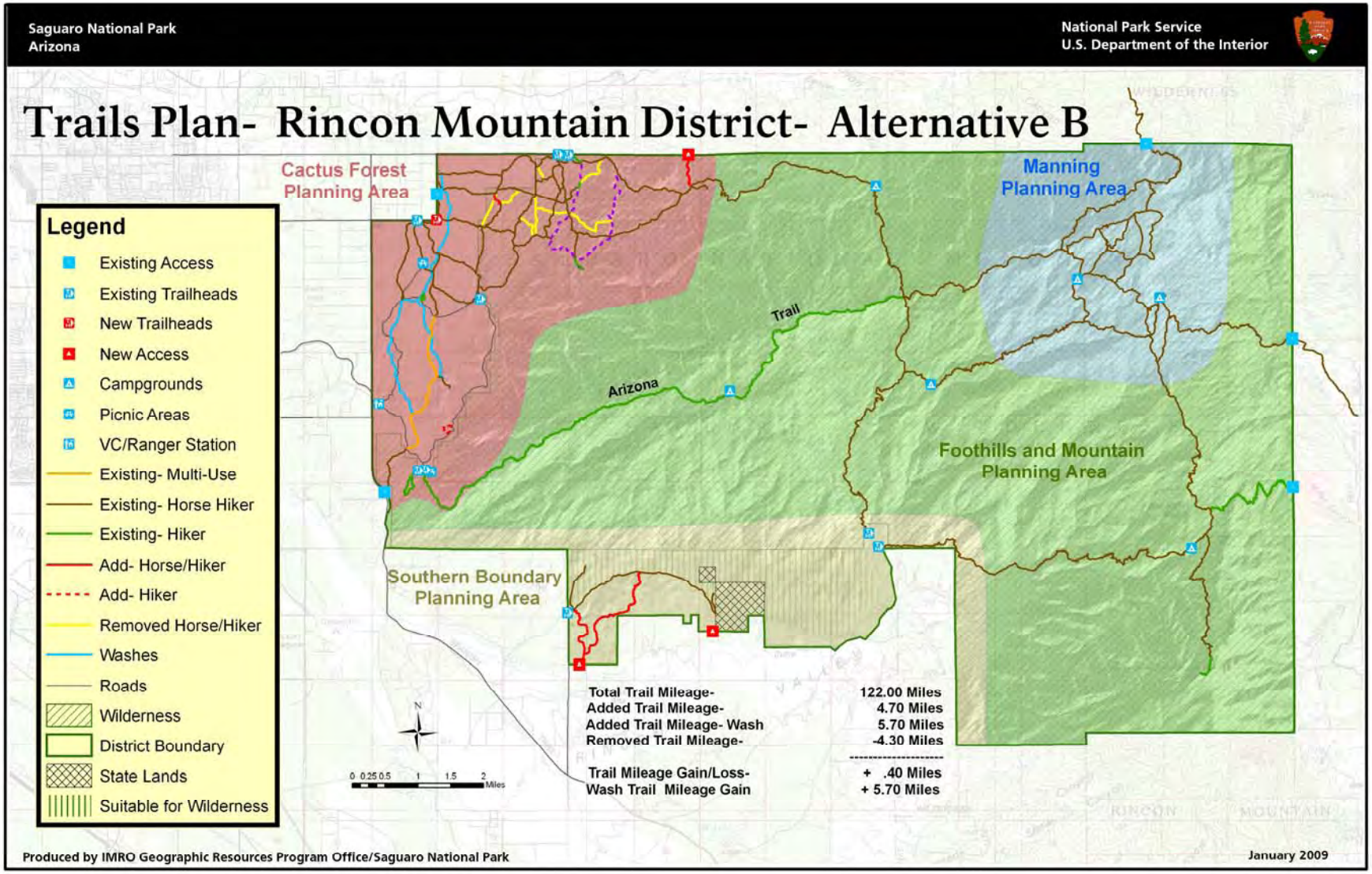
Actions under alternative B would be the same as the no action alternative.

## Access Points and Trailheads

Three new access points and one trailhead are proposed. An access point at the proposed Ernie's Falls Trail would connect to trails on USFS land. In the Cactus Forest area, a new trailhead would be constructed at the eastern terminus of Broadway that would connect to the Shantz Trail and Pink Hill trails (figure 8).

Along the southern boundary, two new access points are proposed. An access point at Coyote Creek would provide access to two new trails that would feed into the Hope Camp Trail. The other access point would be located at the eastern terminus of the Hope Camp Trail.

**Figure 7: Rincon Mountain District – Alternative B**



### Washes

Alternative B would designate the Javelina Wash and its two tributaries south of the Cactus Forest Loop Drive as trails.

## *Rincon Mountain District – Alternative C*

Alternative C was submitted by the Saguaro Concerned Trail Users, a local interest group that use the trails in Saguaro National Park. The group's stated concept of alternative C is, "providing trails that are safe, offer variety and convenience, are sustainable over the long term, meet user demand for multiuse, and disperse users to reduce perceptions of crowding."

### Manning Camp Planning Area

Actions under alternative C would be the same as alternative A.

### Southern Boundary Planning Area

The trail configuration under alternative C would be the same as alternative B, except that bicycles would be allowed on Hope Camp Trail, and the North Hope Camp Trail would be removed and restored to natural conditions.

### Arizona Trail

Under alternative C, the Arizona Trail would follow the same alignment as alternative A.

### Cactus Forest Planning Area

In the Cactus Forest Loop area, a new multiuse trail would be constructed from Old Spanish Trail near Escalante Road, north of designated Wilderness, and would connect to the Cactus Forest multiuse trail. Similar to alternative B, under alternative C, a hiker only trail would be constructed around Javelina Rocks and would be accessed by Cactus Forest Loop Drive. Under alternative C, Lime Falls Trail would not be extended to the Cactus Forest Loop Drive.

In the Cactus Forest trail system accessed by Speedway and Broadway boulevards, the following trails would be removed and restored to natural conditions:

- Palo Verde (Shantz to Creosote)
- Freight Wagon (Carillo to Bajada Vista)
- Wagon Spur
- Wentworth (Javelina Wash to Loma Verde, Kennedy to Garwood)
- Bajada Vista (Garwood to Carillo)
- Saguaro (reroute and removal)
- Wildhorse (Freight Wagon to Bajada Vista)
- Creosote
- Reroute Saguaro north of Pink Hill and rename to Loma Verde

A new trail originating at the proposed Freeman Road access would connect with the Shantz Trail.

### Foothills and Mountains Planning Area

Actions under alternative C would be the same as the no action alternative.

### Access Points and Trailheads

Six access points and one new trailhead are proposed under alternative C. Similar to alternative B, access points would be located at Ernie's Falls, Coyote Creek, and Hope Camp trails.

Three additional access points are proposed in the Cactus Forest Planning Area. An access point along the northern boundary, at the intersection of Speedway and Wentworth, would connect with the Shantz Trail via a new trail. Along the western boundary, an access point along Freeman Road would connect to the Shantz Trail via a new trail.

Also along the western boundary, a new access point at the intersection of the Old Spanish Trail (Irvington) at Shurban Wash, approximately 0.25 mile north of the existing Old Spanish Trail access point, would allow for a new multiuse trail that would be located north of designated wilderness to connect to the Cactus Forest multiuse trail. The existing Old Spanish Trail (Irvington) access would be removed and restored to natural conditions. As in alternative B, under alternative C, two additional access points would be located along the southern boundary at Coyote Creek and Hope Camp trails. As in alternative B, under alternative C, a new trailhead would be located at the eastern terminus of Broadway that would connect to the Shantz and Pink Hill trails.

### Washes

Five major washes would be designated as trails: The Javelina Wash and its two tributaries south of the Cactus Forest Loop Drive, Loma Verde Wash, Monument Wash, Deer Valley Wash, and Bajada Wash.

## *Rincon Mountain District – Preferred Alternative*

As with all the alternatives, the preferred alternative is based on laws, regulations and policies, public health and safety, and the objectives of this plan. In addition, the review and careful consideration of the public comments that were received on alternatives A, B, and C (RMD) during public meetings, by written comment, and newsletter comment periods have been incorporated into this alternative.

### Manning Camp Planning Area

Actions under the preferred alternative would be the same as the no action alternative.

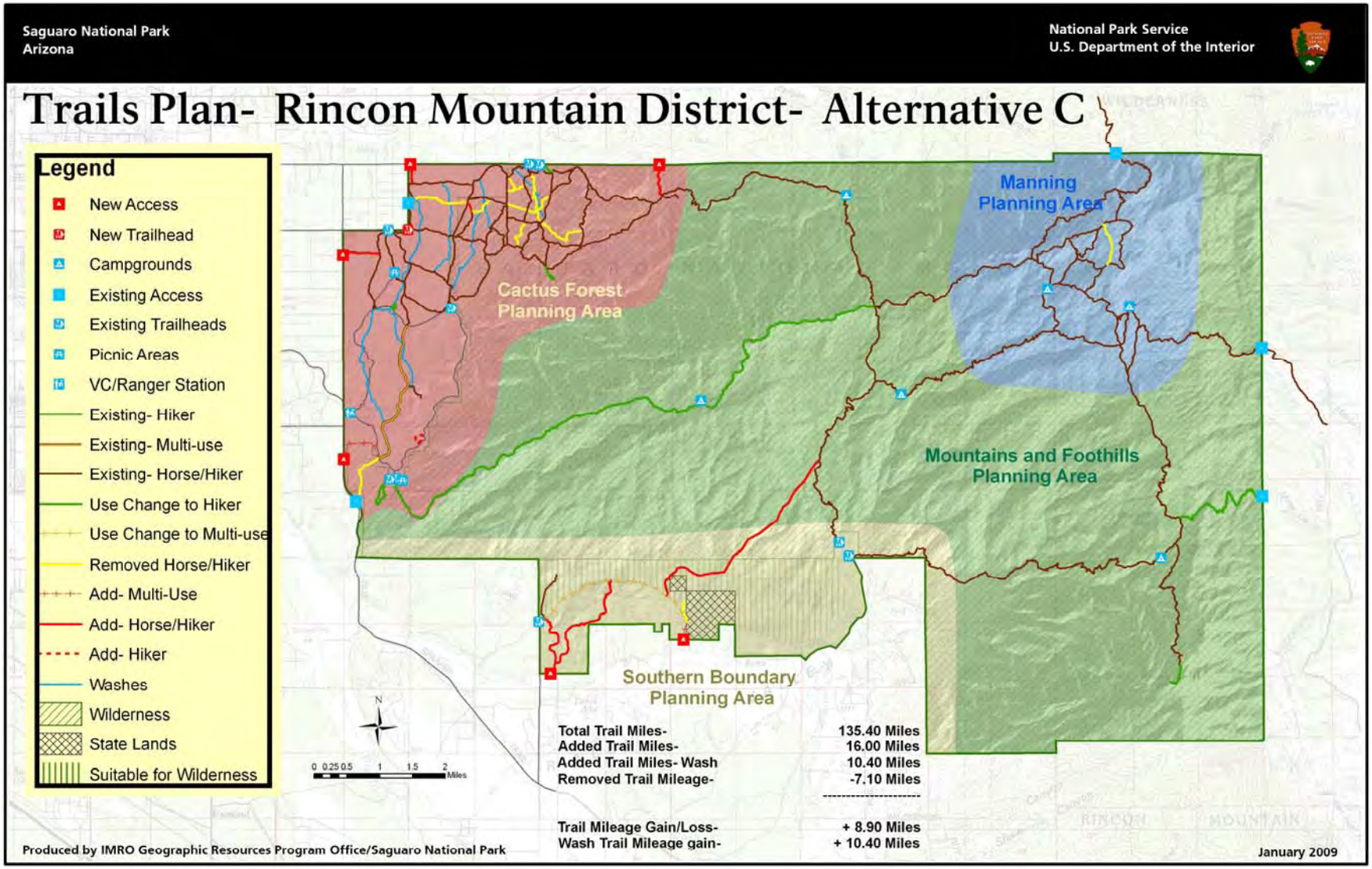
### Southern Boundary Planning Area

Actions under the preferred alternative would be the same as alternative C.

### Arizona Trail

Actions under the preferred alternative would be the same as alternative A.

**Figure 8: Rincon Mountain District – Alternative C**



## Cactus Forest Planning Area

In the Cactus Forest trail system (figure 9), accessed by Speedway and Broadway boulevards, the following trails would be removed and restored to natural conditions:

- Palo Verde (Shantz to Creosote)
- Bajada Vista (Garwood to Carrillo)
- Wentworth (Kennedy to Garwood)
- Kennedy (Wentworth to Carrillo)
- Freight Wagon
- Wagon Spur
- Loma Verde (Pink Hill to Wentworth)
- Reroute Saguaro north of Pink Hill and rename to Loma Verde

The Wentworth Trail between Garwood and Douglas Springs trails would be converted to a hiker only trail and renamed the Converse Trail.

The Wentworth Trail between the Wentworth Access and Kennedy Trail would be renamed the Vanover Trail, to avoid confusion with the county's trail of the same name that follows the Wentworth alignment just west of the park boundary.

The Mica View Trail from the Broadway trailhead to the Mica View Picnic Area would be converted to an ADA challenge trail, and horses would be prohibited on this portion. Equestrians would be able to access the picnic area by using the southern portion of the Mica View Trail that connects with the Cactus Forest Trail.

As in alternative A, under the preferred alternative, the Lime Falls Trail that spurs off of the Cactus Forest Trail would be extended east to connect to the eastern portion of the Cactus Forest Loop Drive, providing access to a unique geologic feature. The trail would include interpretive signs.

## Foothills and Mountains Planning Area

Actions under the preferred alternative would be the same as the No Action alternative.

## Access Points and Trailheads

Four new access points are proposed. Similar to all other action alternatives, the Ernie's Falls access point would connect the Ernie's Falls Trail with existing trails on USFS lands. Along the southern boundary, similar to alternatives B and C, the Coyote Creek and Hope Camp access points are proposed. In addition, a hiker only access gate would be installed at the northern boundary (Speedway Boulevard) at Monument Wash (figures 9 and 10).

The existing access along Wentworth Road may be relocated in the event that the current access is closed by private land owners. If so, it will be relocated a few hundred feet north to the end of 5th St. If this access point is relocated, the Shantz and Vanover (formerly Wentworth) trails would be realigned to terminate at this access point. Also along the western boundary, a new access point at the intersection of Old Spanish Trail (Irvington) at Shurban Wash, approximately 0.25 mile north of the existing Old Spanish Trail access point, would be considered when the Shurban Wash trailhead (Pima County, Natural Resources, Parks, Recreation) is constructed.

**Figure 9: Rincon Mountain District (Cactus Forest Area) – Preferred Alternative**

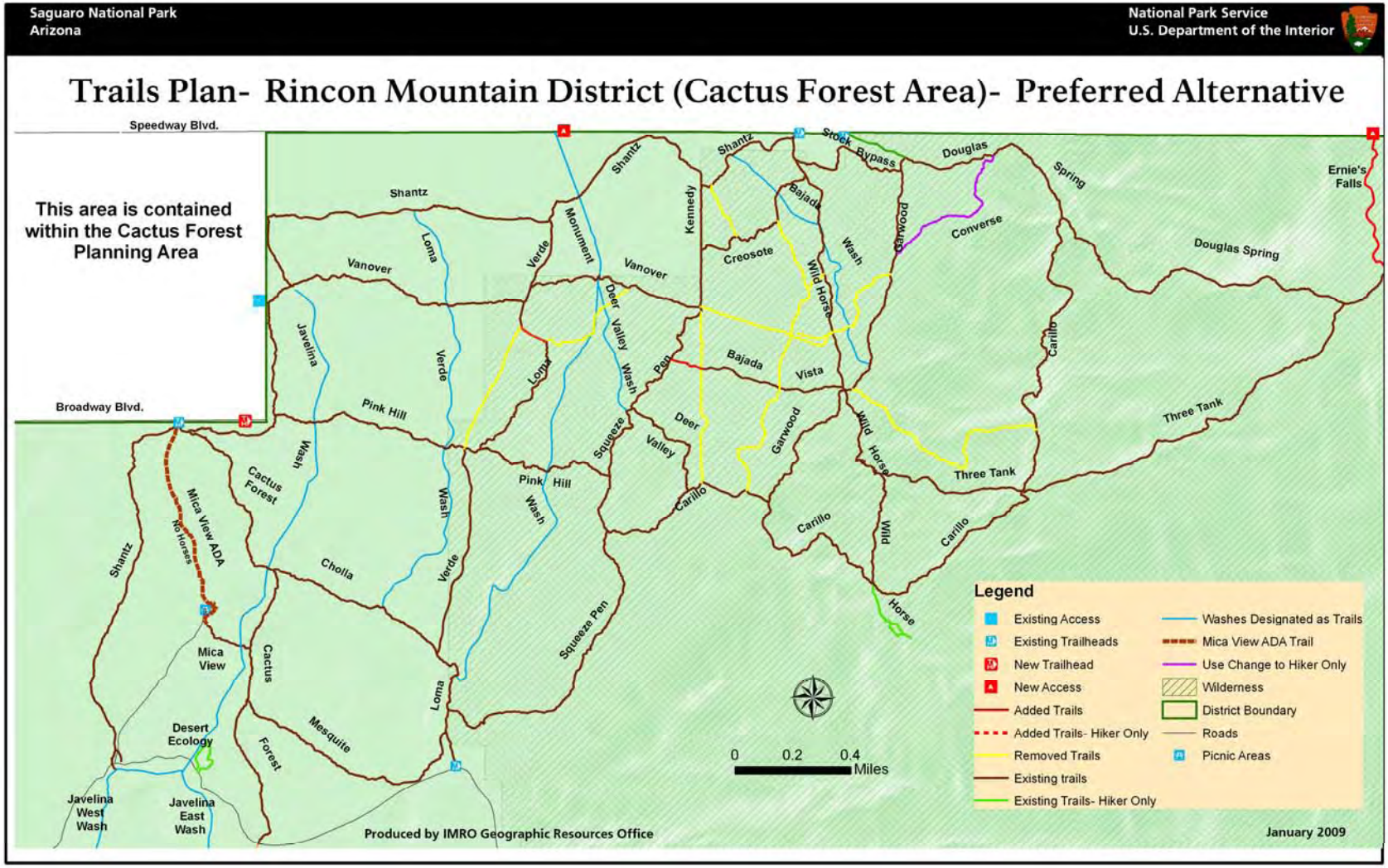
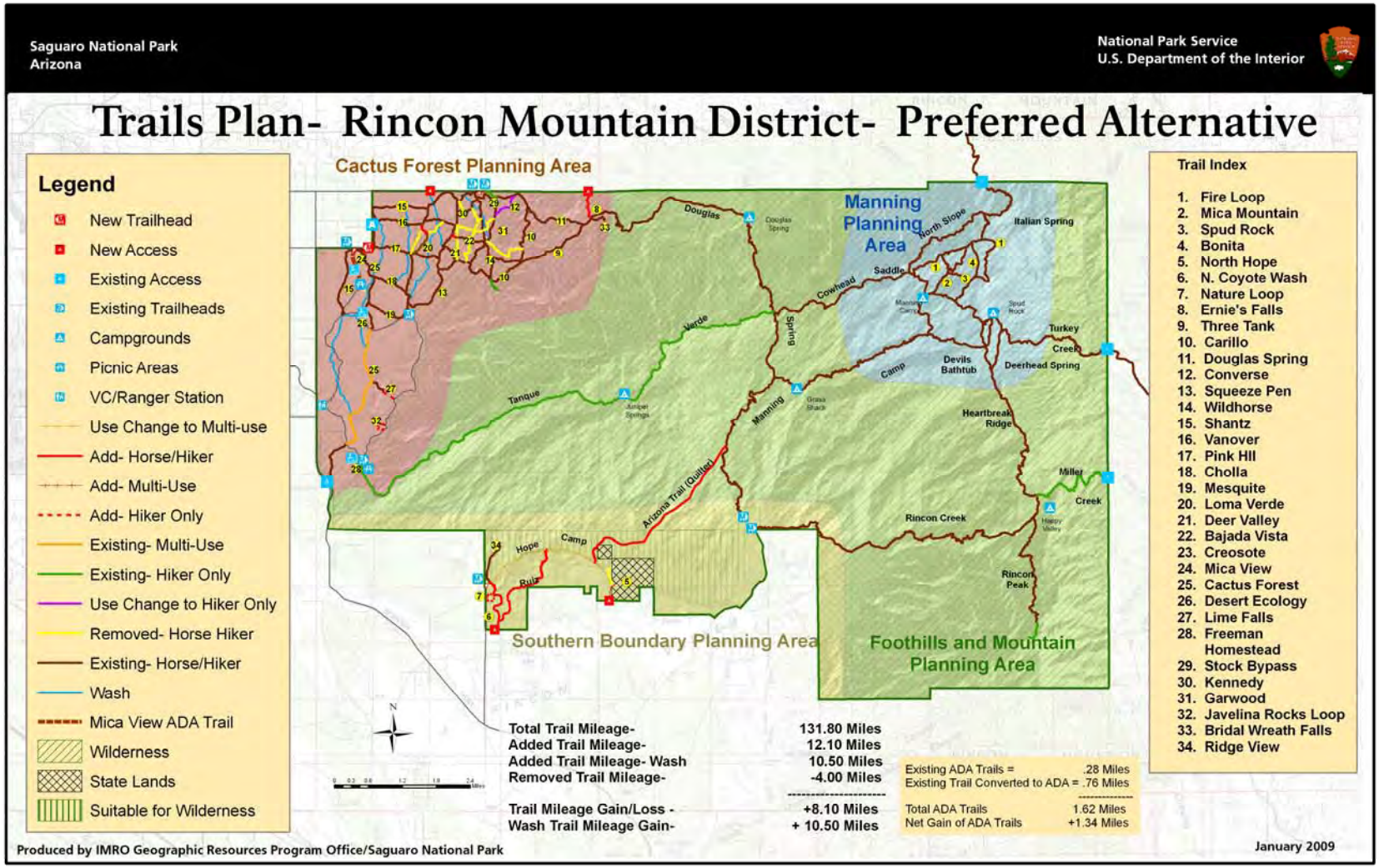


**Figure 10: Rincon Mountain District – Preferred Alternative**



### Washes

Washes proposed as official trails under the preferred alternative would be similar to alternative C. However, the north end of Javelina Wash Trail would terminate at its first intersection with the Shantz Trail. The south end of the Javelina East Wash Trail would terminate at its intersection with the Cactus Forest Trail.

## *Tucson Mountain District – Alternative A*

This alternative focuses on providing reasonable access and a variety of trail recreational experiences while minimizing redundancy in some high density areas. Both existing and new trails were evaluated in terms of access to attraction sites, variety in terrain, vegetation type, user type, popularity, safe travel, and resource protection and sustainability. Some trails in high density areas were eliminated if they did not meet these criteria. Linkages with USFS and Pima County lands have been included to ensure continuity of appropriate trail recreation on neighboring lands

### Northeast Corner Planning Area

One trailhead and one access point would serve an interior loop trail. The remaining social trails would be restored and allowed to return to natural conditions (figure 11). The trail crossing for the Ringtail Trail would be relocated to provide for safer crossing conditions from the Box Canyon parking lot across Picture Rocks Road.

### Northwest Planning Area

Consistent with the GMP, portions of Golden Gate Road would be converted to a multiuse trail that would include bike use.

At the Panther Wash / Roadrunner Trail intersection, a new hiker only trail would be constructed that would provide access to and connect Panther and Safford Peaks.

The northwestern section immediately southwest of Rudasill and Sandario Roads would consist of an ADA interpretive trail that would access the historic CCC camp. Social trails adjacent to Sandario Road would be restored.

### South Central Planning Area

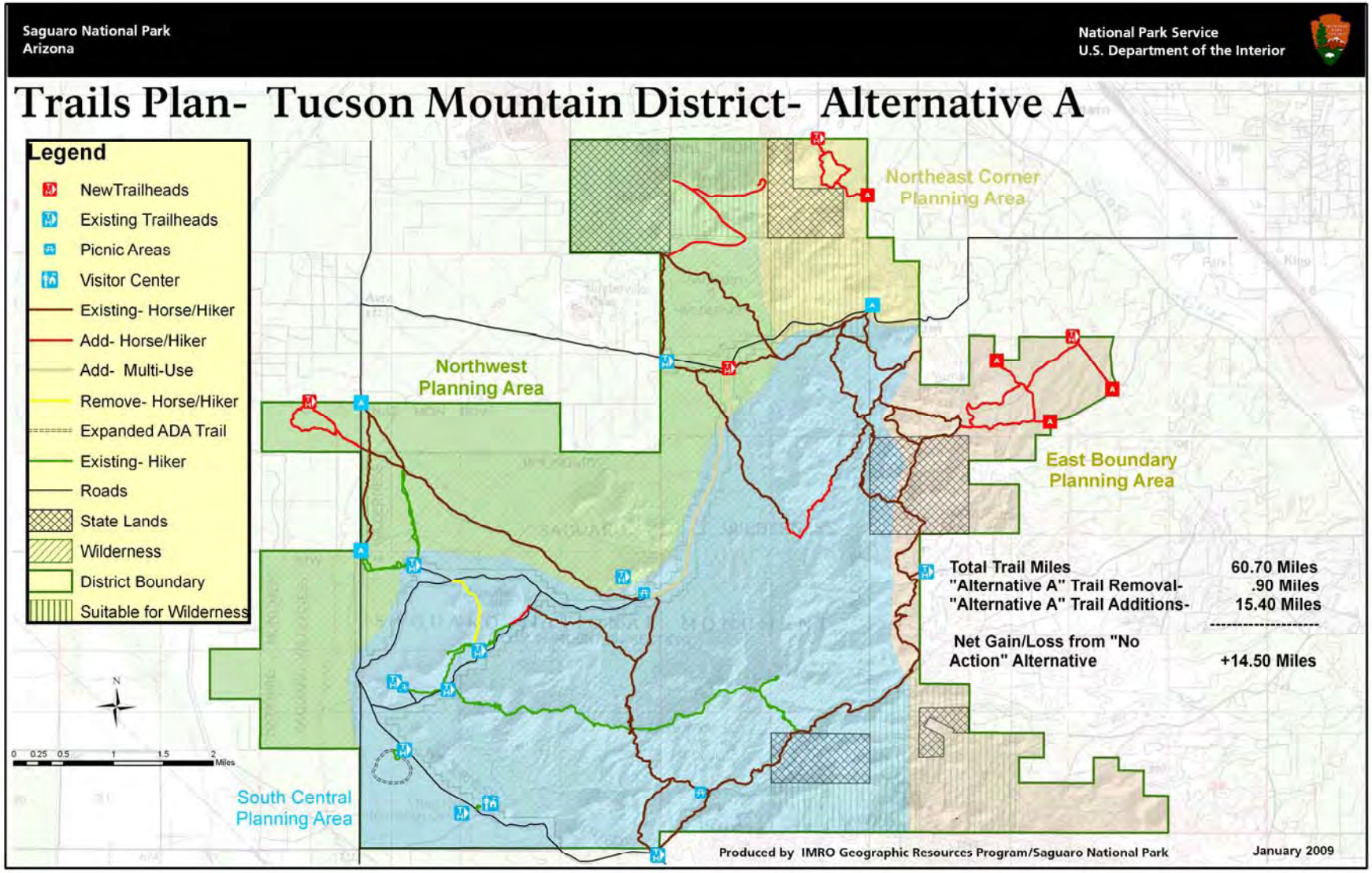
Under alternative A, Golden Gate Road would be converted to a multiuse trail that would include bike use.

A new trail would connect Picture Rocks Wash with Prophecy Wash. Just west of Apache Peak, Wild Dog Trail would be removed and restored to allow it to return to natural conditions, and the Bajada and Dobe Wash trails would connect on the eastern side of Apache Peak. In the southwest portion of the planning area, an ADA compliant trail would be added or “stacked” outside and around the existing Desert Discovery Nature Trail, and an additional ADA trail would be offered at the Red Hills Visitor Center.

### East Boundary Planning Area

A network of social trails that are accessed by the Veteran’s access point, the Belmont Trail**,** and Abbington Roads would be formalized as shown (figure 11)**.** All other social trails and old roads would be restored and allowed to return to natural conditions.

**Figure 11: Tucson Mountain District –Alternative A**



### Access Points and Trailheads

Under alternative A, four new access points and four new trailheads would be constructed. In the East Boundary Planning Area, there would be two access points along Abbington Road: one at the park's southern terminus of the pipeline and one at the end of Abbington Road. A trailhead would be formalized at the park's northern terminus of the pipeline, and an access point would be formalized at the Veteran's access point.

In the Northeast Corner Planning Area, an access point would be formalized along the area's eastern boundary in the Continental Reserve subdivision, and a trailhead would be formalized on the northern boundary along Scenic Drive.

Two additional trailheads would be added: one at the proposed parking lot at the northern terminus of the Golden Gate Trail at Picture Rocks Road in the South Central Planning Area and the second at the CCC camp in the Northwest Planning Area.

### Washes

Actions under alternative A would be the same as the no action alternative.

## *Tucson Mountain District – Alternative B*

Alternative B focuses on retaining sustainable trails in some of the more popular or well-established areas of the park, while protecting natural and cultural resources in other areas of the park. Some high density areas may have more trail miles than alternative A (table 1, trail mileage placeholder). To offset resource and maintenance concerns associated with higher densities, some multiuse trails that have sustainability issues have been converted to single-use trails.

### Northeast Corner Planning Area

Social trails that create three loop trails would be formalized and accessed by three access points. As in alternative A, the Ringtail Trail crossing would be relocated to a safer location. All remaining social trails would be restored and allowed to return to natural conditions (figure 12).

### Northwest Planning Area

As in alternative A, under alternative B, portions of Golden Gate Road would be converted to a multiuse trail, and a new hiker only trail would be constructed to provide access to Panther and Safford Peaks.

Also similar to alternative A, an ADA interpretive trail would access the historic CCC camp. An additional access and spur trail would be constructed to provide access to the western portion of the CCC camp area. The access trail and the southern portion of the loop trail would be open to horse use while the ADA compliant portion would not be. Horses would be discouraged from the site but would be able to hitch nearby.

### South Central Planning Area

As in alternative A, under alternative B, Golden Gate Road would be converted to a multiuse trail. As in alternative A, under alternative B, Picture Rocks Wash would connect with Prophecy Wash. In the Apache Peak area, Wild Dog Trail would remain to provide a short hike just west of the peak. Bajada and Dobe Wash trails would remain separate trails and would not be connected.

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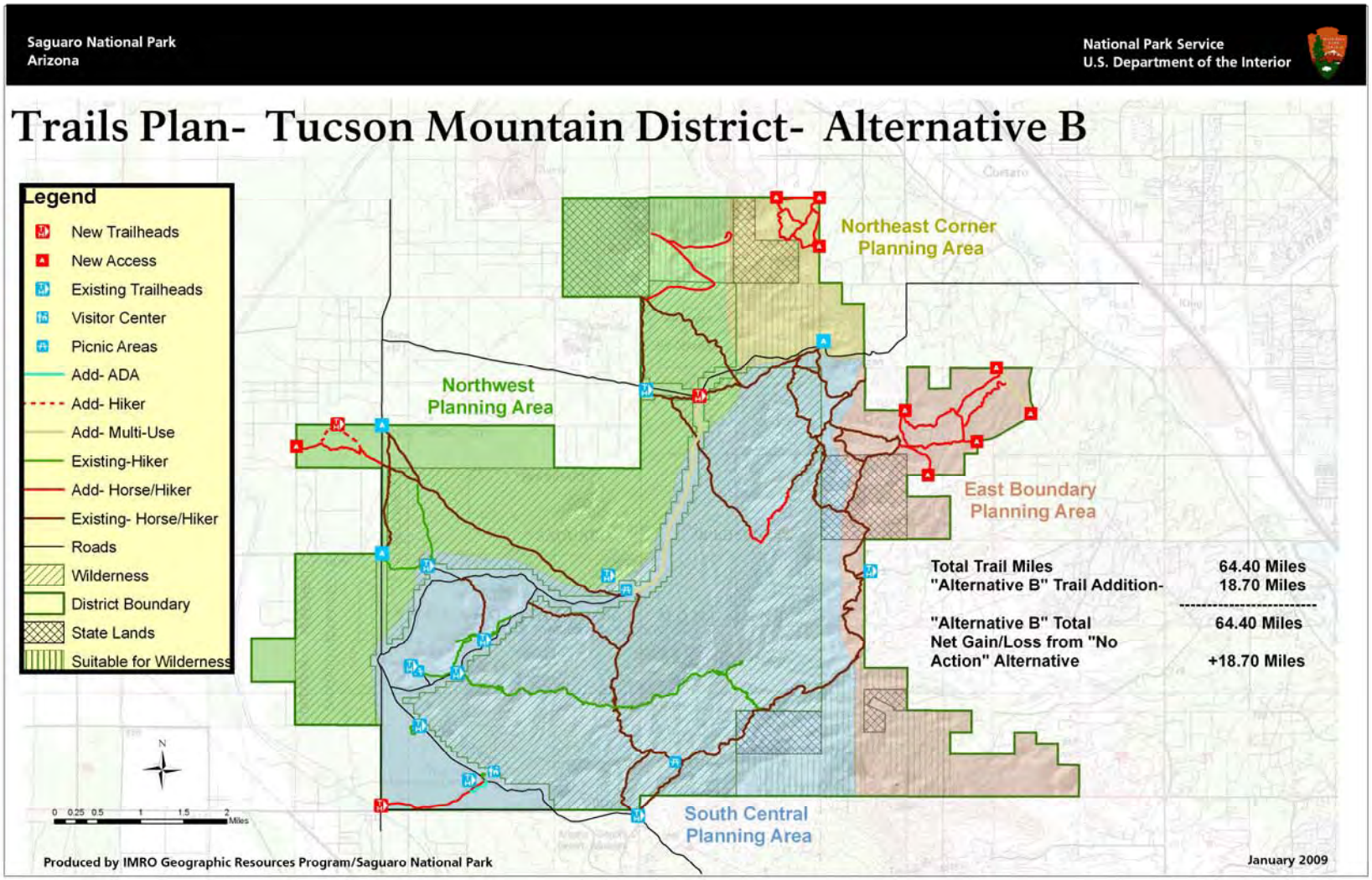
**Figure 12: Tucson Mountain District – Alternative B**



### East Boundary Planning Area

In the East Boundary Planning Area under alternative B, a network of social trails would be formalized as shown. The Belmont Trail would be open to hiking, biking, and equestrian use. All other social trails and old roads would be restored and allowed to return to natural conditions

### Access Points and Trailheads

Nine access points and three trailheads are proposed. In the East Boundary Planning Area, five access points would be designated around the trail network accessed by Abbington Road. In the Northeast Corner Planning Area, three access points and a trailhead would be formalized: one access point at the end of Scenic Drive; and two from the Continental Reserve subdivision. In the Northwest Planning Area, one access point along the western boundary would be created to access the CCC camp via a proposed trail from Sanders Road.

A trailhead would be constructed near the proposed parking lot for the northern terminus of the Golden Gate Trail in the South Central Planning Area. A trailhead would also be created at a small parking lot along Rudasill Road at the CCC camp. The trailhead that the county built at the intersection of Sandario and Mile Wide roads would provide access to the proposed trail from the Red Hills Visitor Center to the southwestern corner of the TMD, once the proposed Central Arizona Project Trail is constructed.

### Washes

Under alternative B, animal Wash and King Canyon Wash would be designated as an official trails in addition to the five existing washes included in the No Action alternative.

## *Tucson Mountain District – Preferred Alternative*

As with all the alternatives, the preferred alternative is based on laws, regulations and policies, public health and safety, and the objectives of this plan. In addition, the review and careful consideration of the public comments that were received on alternatives A, B during public meetings, by written comment, and newsletter comment periods have been incorporated into this alternative.

### Northeast Corner Planning Area

Under the preferred alternative, two loop trails with three spur trails that connect to access points would be formalized. All other trails would be removed and restored to natural conditions.

### Northwest Planning Area

Actions under the preferred alternative would be the same as alternative B. In addition, the Cactus Wren and all of the Manville Trail would be converted from hiker only to hiker/equestrian use.

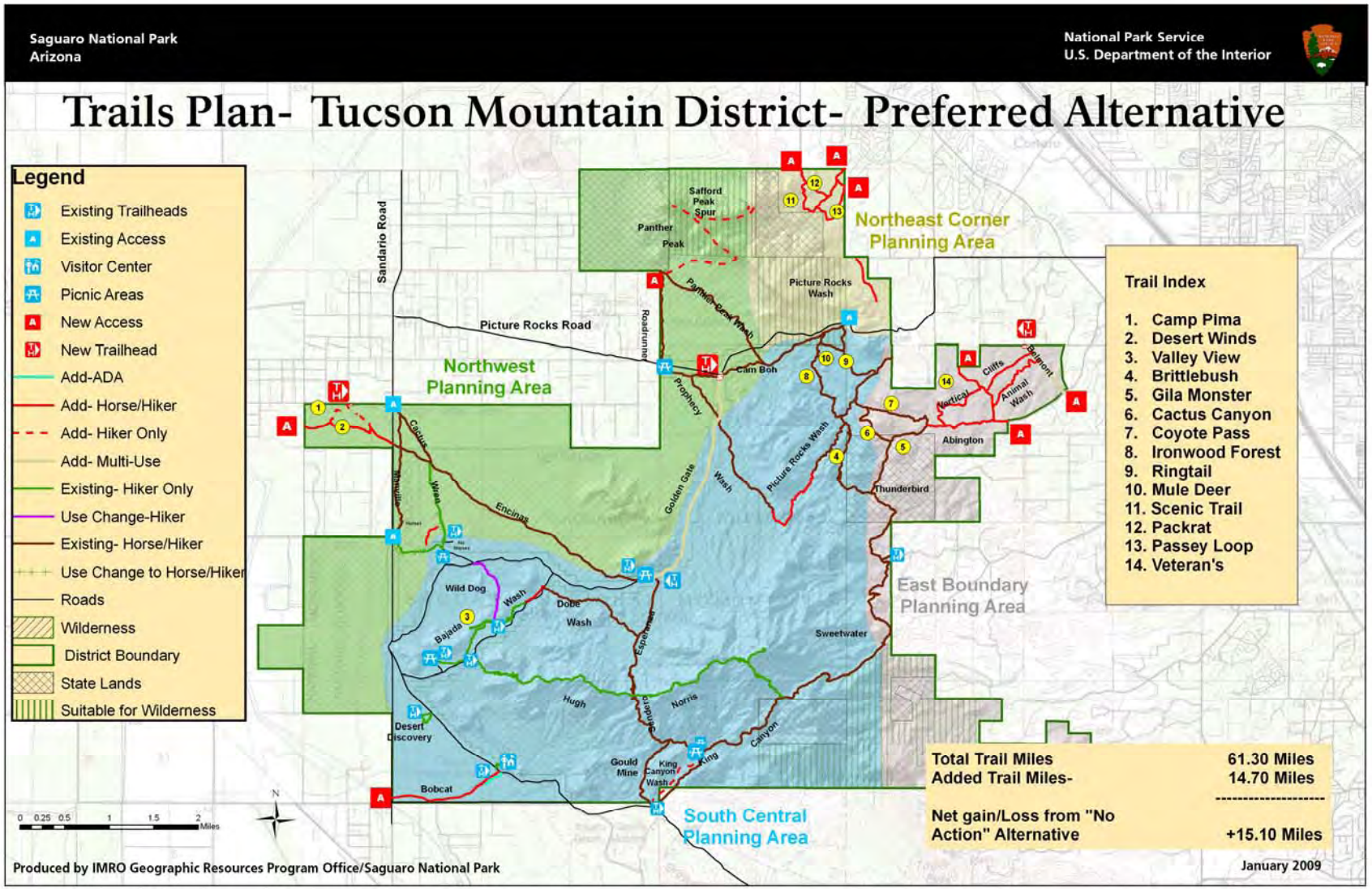
### South Central Planning Area

As in alternative A, under the preferred alternative, Golden Gate Road would be converted to a multiuse trail.

Similar to other action alternatives, Picture Rocks Wash would connect with Prophecy Wash. Wild Dog Trail would remain and would be converted to a hiker only trail (figure 13). Bajada and Dobe Wash trails would connect on the eastern side of Apache Peak. Bajada Wash Trail would also be hiker only.

At Signal Hill, horses would be rerouted around the northern portion of the hill, and a hitching post would be installed close to the picnic area. The picnic area and trail from the picnic area to Signal Hill would be hiker only.

**Figure 13: Tucson Mountain District – Preferred Alternative**



In the southwestern section of the planning area, a new trail, the Bobcat Trail, would be added from the Red Hills Visitor Center to the southwestern corner of the TMD (Intersection of Sandario and Mile Wide roads), once the proposed Central Arizona Project Trail is constructed. A new ADA compliant trail would loop off the Bobcat Trail just southwest of the Red Hills Visitor Center

### East Boundary Planning Area

As in alternative B, under the preferred alternative, the network of social trails would be formalized as shown; however, trails that spur to the south and to the west and that create access points to private land would be removed and restored to natural conditions. The Belmont Trail would be a multiuse trail open to hiking, biking, and equestrian use. All other social trails and old roads would be restored and allowed to return to natural conditions.

### Access Points and Trailheads

Nine access points and three trailheads are proposed. Spur trails would be accessed at the end of Scenic Drive and two public access areas within the Continental Reserve Subdivision. Four access points would be formalized in the Abbington Road area of the East Boundary Planning Area.

A new trailhead and parking lot would be located at the northern terminus of the Golden Gate multiuse trail, and at Sandero-Esperanza parking lot at the southern terminus of the Golden Gate multiuse trail would be expanded. A new trailhead would be built on Rudasill Road to access the historic CCC Camp.

An access point would be created for the proposed trail from the Red Hills Visitor Center to the southwestern corner of the TMD (Intersection of Sandario and Mile Wide roads) once the proposed Central Arizona Project Trail is constructed.

An access point would be created along Sanders Road across from the county park on the western extension of the district, as under alternative B

### Washes

Under the preferred alternative, animal Wash and King Canyon Wash would be designated as official trails. In addition, Picture Rocks Wash is an extension of the Picture Rocks Wash Trail and would be designated as an official trail in addition to the five existing washes included in the no action alternative.

## *How Alternatives Meet Objectives*

All action alternatives selected for analysis must meet all objectives to a large degree. The action alternatives must also address the stated purpose of taking action and resolve the need for action. Alternatives were individually assessed to determine how well they would meet the objectives of this plan/EA.

Table 2 summarizes the elements of the alternatives being considered. “Chapter 4: Environmental Consequences,” describes the effects of each alternative on each impact topic, including the impact on recreational values and visitor experience. These impacts are summarized in table 3.

## *Alternatives Considered but Dismissed from Further Consideration*

The park staff carefully considered numerous trail, parking lot, and access point suggestions during the scoping and alternatives development process for this plan. Many ideas were incorporated as elements of alternatives, or as entire alternatives such as alternative C (RMD only). Many suggestions were not considered because they did not meet the objectives of the plan, or because another trail, parking lot, or access point better achieved the objectives of the plan.

## The Environmentally Preferred Alternative

The environmentally preferred alternative is defined by the Council on Environmental Quality (CEQ) as the alternative that best meets the following criteria or objectives, as set out in section 101 of the NEPA:

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

The preferred alternative has also been selected as the environmentally preferred alternative because it is the alternative that would best protect the biological and physical environment by diverting park visitors away from sensitive species habitats and reducing redundant trails. Use would be concentrated to specific trails, ensuring protection of the biological and physical environment as well as of historic structures and archeological resources.

Although alternatives A, B and C (RMD only) are very close in meeting the goal that identifies the environmentally preferred alternative, the preferred alternative was selected primarily because of its greater certainty in achieving the goal. Alternatives A, B and C were not considered environmentally preferred because the overall locations of a subset of proposed trails and access points would result in potential adverse effects on the biological and physical resources of the park over the life of the plan.

**Table 2: Comparison of Alternative Elements**

| | No Action | Alternative A | Alternative B | Alternative C | Preferred Alternative |
|---|---|---|---|---|---|
| RMD | | | | | |
| Manning Camp | No trails added; no trails removed; no washes would be designated as trails. | Remove and restore Bonita Trail to natural conditions. | Same as the no action alternative. | Same as alternative A. | Same as the no action alternative. |
| Southern Boundary | No trails added; no trails removed; no washes would be designated as trails. | Extend eastern portion of Hope Trail to southern park boundary to new access point.<br><br>Remove North Hope Camp Trail and restore to natural conditions.<br><br>Arizona Trail would connect to the Hope Camp Trail and continue 4.2 mi NE to connection with Manning Camp Trail.<br><br>Convert Hope Trail to multiuse to allow bicycle, horse, and hiker use. | New Hope Trail access point at southern park boundary. Same as alternative A.<br><br>New access point located at the eastern terminus of the Hope Camp Trail in Coyote Creek area.<br><br>New Coyote Creek access point at Coyote Creek to two new trails that would feed into the Hope Camp Trail.<br><br>Two trails would be constructed from the new access point in Coyote Creek area:<br>• One trail would connect with the Hope Camp/Ridge View trailhead near the proposed Rocking K Education Center.<br>• The other trail would connect at the midway point along the Hope Camp Trail.<br><br>Bicycles would be prohibited on the Hope Camp Trail, and the North Hope Camp Trail would remain. | The trail configuration and access points would be the same as alternative B except the North Hope Camp Trail would be removed and restored to natural conditions.<br><br>Also, the Arizona Trail would follow the same alignment as alternative A.<br><br>Bicycles would be allowed on Hope Camp Trail. | The trail configuration and access points would be the same as alternative C.<br><br>The Arizona Trail would follow the same alignment as alternative A. |
| Cactus Forest | No trails added; no trails removed; no washes would be designated as trails. | Along the western boundary, the Old Spanish Trail (Irvington) access would be relocated approximately 0.25 mile north of the existing location to a location that would connect near the Shurban Wash and allow for greater sight distance along Old Spanish Trail.<br><br>In the Cactus Forest Loop area, the Lime Falls Trail that spurs off of the Cactus Forest Trail would be extended east to connect to the eastern portion of the Cactus Forest Loop Drive.<br><br>In the Cactus Forest trail system that is accessed by Speedway and Broadway boulevards, the following trails would be removed and restored to natural conditions:<br>• Mica View (Broadway Trailhead to the Mica View Picnic Area)<br>• Loma Verde (Wentworth to Pink Hill)<br>• Kennedy (from Squeeze Pen to Carrillo)<br>• Palo Verde<br>• Bajada Vista<br>• Freight Wagon (Creosote to Wentworth)<br>• Wagon Spur<br>• Garwood (Wentworth to Carillo) | A new trailhead would be constructed at the eastern terminus of Broadway that would connect to the Shantz Trail and Pink Hill trails. A proposed access point at the proposed Ernie's Falls Trail would connect to trails on USFS land.<br><br>In the Cactus Forest Loop Road area, a hiker only trail would be located around Javelina Rocks and accessed from the Cactus Forest Loop Drive.<br><br>In the Cactus Forest trail system accessed by Speedway and Broadway boulevards, the following trails would be removed and restored to natural conditions:<br>• Loma Verde (Wentworth to Pink Hill)<br>• Palo Verde (Shantz to Creosote)<br>• Kennedy (Squeeze Pen to Carillo)<br>• Wentworth (Garwood to Douglas Springs)<br>• Bajada Vista<br>• Reroute Saguaro north of Pink Hill | An access point along the northern boundary, at the intersection of Speedway and Wentworth, would connect with the Shantz Trail via a new trail. Along the western boundary, an access point along Freeman Road would connect to the Shantz Trail via a new trail. As in alternative B, a proposed access point at the proposed Ernie's Falls Trail would connect to trails on USFS land.<br>Also along the western boundary, a new access point at the intersection of Old Spanish Trail (Irvington) at Shurban Wash, approximately 0.25 mile north of the existing Old Spanish Trail access point, would be located to connect to the Cactus Forest multiuse trail.<br><br>The existing Old Spanish Trail (Irvington) access would be removed and restored to natural conditions.<br><br>In the Cactus Forest Loop area, a new | The Ernie's Falls access point would connect the Ernie's Falls Trail with existing trails on USFS lands.<br>A hiker only access gate would be installed at the northern boundary (Speedway Boulevard) at Monument Wash. The existing access along Wentworth Road may be relocated a few hundred feet north to the end of 5th Street. If this access point is relocated, the Shantz and Vanover (formerly Wentworth) trails would be realigned to terminate at this access point.<br><br>As in alternative A, the Lime Falls Trail that spurs off of the Cactus Forest Trail would be extended east to connect to the eastern portion of the Cactus Forest Loop Drive.<br><br>In the Cactus Forest trail system, accessed by Speedway and Broadway boulevards, the following trails would be removed and restored to natural conditions: |

| | No Action | Alternative A | Alternative B | Alternative C | Preferred Alternative |
|---|---|---|---|---|---|
| | | • Wentworth (Douglas Springs to Garwood)<br>• Reroute Saguaro north of Pink Hill and rename to Loma Verde<br><br>Three trails would be added to this area: The Ernie's Falls Trail would be constructed to connect the Douglas Spring Trail to existing trails on USFS land. A new trail originating at the proposed Wentworth access point would connect with the Shantz Trail, and a trail would be constructed from the Shantz Trail to the Mica View Picnic Area.<br><br>Loma Verde, Monument, and Deer Valley washes would be designated as trails. | and rename to Loma Verde.<br><br>The Carillo and Garwood trails would be converted to hiker only trails.<br>As in alternative A, the Ernie's Falls Trail would be constructed to connect the Douglas Spring Trail to existing trails on USFS land.<br><br>Javelina Wash and its two tributaries south of the Cactus Forest Loop Drive would be designated as trails. | multiuse trail would be constructed from Old Spanish Trail near Escalante Road, north of designated Wilderness, and connect to the Cactus Forest multiuse trail. Similar to alternative B, a hiker only trail would be constructed around Javelina Rocks and accessed by Cactus Forest Loop Drive.<br><br>In the Cactus Forest trail system accessed by Speedway and Broadway boulevards, the following trails would be removed and restored to natural conditions:<br>• Palo Verde (Shantz to Creosote)<br>• Freight Wagon (Carillo to Bajada Vista)<br>• Wagon Spur<br>• Wentworth (Javelina Wash to Loma Verde, Kennedy to Garwood)<br>• Bajada Vista (Garwood to Carillo)<br>• Saguaro (reroute and removal)<br>• Wildhorse (Freight Wagon to Bajada Vista)<br>• Creosote<br>• Reroute Saguaro north of Pink Hill and rename to Loma Verde<br><br>A new trail originating at the proposed Freeman Road access would connect with the Shantz Trail.<br><br>Javelina Wash and its two tributaries south of the Cactus Forest Loop Drive; Loma Verde Wash; Monument Wash; Deer Valley Wash; and Bajada Wash would be designated as trails. | • Palo Verde (Shantz to Creosote)<br>• Bajada Vista (Garwood to Carrillo)<br>• Wentworth (Kennedy to Garwood)<br>• Kennedy (Wentworth to Carrillo)<br>• Freight Wagon<br>• Wagon Spur<br>• Loma Verde (Pink Hill to Wentworth)<br>• Reroute Saguaro north of Pink Hill and rename to Loma Verde<br><br>The Wentworth Trail between Garwood and Douglas Springs trails would be converted to a hiker only trail and renamed the Converse Trail.<br><br>The Wentworth Trail between the Wentworth Access and Kennedy Trail would be renamed the Vanover Trail, to avoid confusion with the county's trail of the same name that follows the Wentworth alignment just west of the park boundary.<br><br>The Mica View Trail from the Broadway trailhead to the Mica View Picnic Area would be converted to an ADA challenge trail, and horses would be prohibited on this portion. Equestrians would be able to access the picnic area by using the southern portion of the Mica View Trail that connects with the Cactus Forest Trail.<br><br>Washes proposed as official trails would be similar to alternative C. However, the north end of Javelina Wash Trail would terminate at its first intersection with the Shantz Trail. The south end of the Javelina East Wash Trail would terminate at its intersection with the Cactus Forest Trail. |
| Foothills and Mountains | No trails added, no trails removed, no washes would be designated as trails. | Same as the no action alternative. | Same as the no action alternative except the Arizona Trail would follow the alignment of the existing Tanque Verde Ridge Trail, originating at the Tanque Verde Ridge trailhead at the Javelina Picnic Area. Horses would be prohibited. | Same as the no action alternative. | Same as the no action alternative. |
| TMD | | | | | |
| Northeast Corner | No trails added, and no trails removed. No washes not already designated as official trails would be designated. | An access point would be formalized along the area's eastern boundary in the Continental Reserve subdivision, and a trailhead would be formalized on the northern boundary along Scenic Drive.<br><br>The trail crossing for the Ringtail Trail would be | Social trails that create three loop trails would be formalized and accessed by the three access points.<br><br>As in alternative A, the Ringtail Trail crossing would be relocated to a safer | Not Applicable | Two loop trails with three spur trails that connect to access points would be formalized. |

| | No Action | Alternative A | Alternative B | Alternative C | Preferred Alternative |
|---|---|---|---|---|---|
| | | relocated to provide for safer crossing conditions from the Box Canyon parking lot across Picture Rocks Road. | location. | | |
| Northwest | No trails added, and no trails removed. No washes not already designated as official trails would be designated. | An additional trailhead would be added at the CCC camp.<br><br>An ADA interpretive trail would access the historic CCC camp.<br><br>At the Panther Wash / Roadrunner Trail intersection, a new hiker only trail would be constructed that would provide access to and connect Panther and Safford Peaks. | One access point along the western boundary would be created to access the CCC camp via a proposed trail from Sanders Road.<br><br>A trailhead would also be created at a small parking lot along Rudasill Road at the CCC camp.<br><br>The northwestern section immediately southwest of Rudasill and Sandario Roads would consist of an ADA interpretive trail that would access the historic CCC camp.<br><br>An additional access and spur trail would be constructed to provide access to the western portion of the CCC camp area. The access trail and the southern portion of the loop trail would be open to horse use, while the ADA compliant portion would be closed to horse use. Horses would be discouraged from the site but would be able to hitch nearby.<br><br>As in alternative A, a new hiker only trail would be constructed to provide access to Panther and Safford Peaks. | Not Applicable | A new trailhead would be built on Rudasill Road to access the historic CCC Camp.<br><br>An access point would be created along Sanders Road across from the county park on the western extension of the district, as under alternative B.<br><br>Trail configurations would be the same as alternative B. In addition, the Cactus Wren and all of the Manville Trail would be converted from hiker only to hiker/equestrian use. |
| South Central | No trails added, and no trails removed. No washes not already designated as official trails would be designated. | An additional trailhead would be added at the proposed parking lot at the northern terminus of the Golden Gate Trail at Picture Rocks Road.<br><br>A new trail would connect Picture Rocks Wash with Prophecy Wash.<br><br>Just west of Apache Peak, Wild Dog Trail would be removed and restored to allow it to return to natural conditions, and the Bajada and Dobe Wash trails would connect on the eastern side of Apache Peak.<br><br>An ADA compliant trail would be added or “stacked” outside and around the existing Desert Discovery Nature Trail, and an additional ADA trail would be offered at the Red Hills Visitor Center.<br><br>King Canyon Wash would be designated as an official trail. | A trailhead would be constructed near the proposed parking lot for the northern terminus of the Golden Gate Trail in the South Central Planning Area.<br><br>The trailhead that the county built at the intersection of Sandario and Mile Wide Roads would provide access to the proposed trail from the Red Hills Visitor Center to the southwestern corner of the TMD, once the proposed Central Arizona Project Trail is constructed.<br><br>As in alternative A, Picture Rocks Wash would connect with Prophecy Wash.<br><br>In the Apache Peak area, Wild Dog Trail would remain to provide a short hike just west of the peak. Bajada and Dobe Wash trails would remain separate trails and would not be | Not Applicable | A new trailhead and parking lot would be located at the northern terminus of the Golden Gate multiuse trail, and at Sandero-Esperanza parking lot at the southern terminus of the Golden Gate multiuse trail would be expanded.<br><br>An access point would be created for the proposed trail from the Red Hills Visitor Center to the southwestern corner of the TMD (Intersection of Sandario and Mile Wide Roads) once the proposed Central Arizona Project Trail is constructed.<br><br>As in alternative A, Picture Rocks Wash would connect with Prophecy Wash.<br><br>Wild Dog Trail would remain and would be converted to a hiker only trail.<br><br>Bajada and Dobe Wash trails would connect on the eastern side of Apache |

| | No Action | Alternative A | Alternative B | Alternative C | Preferred Alternative |
|---|---|---|---|---|---|
| | | | connected.<br><br>In the southwestern portion of the planning area, a trail would be constructed from the Red Hills Visitor Center to the southwestern boundary of the TMD (Intersection of Sandario and Mile Wide Roads) once the proposed Central Arizona Project Trail is constructed. | | Peak. Bajada Wash Trail would also be hiker only.<br><br>At Signal Hill, horses would be rerouted around the northern portion of the hill and a hitching post would be installed close to the picnic area. The picnic area and trail from the picnic area to Signal Hill would be hiker only.<br><br>In the southwestern section of the planning area, a new trail, the Bobcat Trail, would be added from the Red Hills Visitor Center to the southwestern corner of the TMD (Intersection of Sandario and Mile Wide Roads) once the proposed Central Arizona Project Trail is constructed.<br><br>A new ADA compliant trail would loop off the Bobcat Trail just southwest of the Red Hills Visitor Center.<br><br>King Canyon Wash would be designated as an official trail. Picture Rocks Wash is an extension of the Picture Rocks Wash Trail and would be designated as an official trail in addition to the five existing washes included in the no action alternative. |
| East Boundary | No trails added, and no trails removed. No washes not already designated as official trails would be designated. | Two access points along Abbington Road — one at the park's southern terminus of the pipeline and one at the end of Abbington Road — would be formalized.<br><br>A trailhead would be formalized at the park's northern terminus of the pipeline, and an access point would be formalized at the "Veteran's" access point.<br><br>A network of social trails that are accessed by the Veteran's access point, the Belmont Trail, and Abbington Roads would be formalized.<br><br>Animal Wash would be designated as an official trail. | Three access points and a trailhead would be formalized — one access point at the end of Scenic Drive and two from the Continental Reserve subdivision.<br><br>Five access points would be designated around the trail network accessed by Abbington Road.<br><br>A network of social trails would be formalized. The Belmont Trail would be open to hiking, biking, and equestrian use. | Not Applicable | Four access points would be formalized in the Abbington Road area of the East Boundary Planning Area.<br><br>Spur trails would be accessed at the end of Scenic Drive and at two public access areas within the Continental Reserve Subdivision.<br><br>As in alternative B, a network of social trails would be formalized; however, trails that spur to the south and to the west and create access points to private land would be removed and restored to natural conditions.<br><br>The Belmont Trail would be a multiuse trail open to hiking, biking, and equestrian use.<br><br>Animal Wash would be designated as an official trail. |

**Table 3: Summary of Impacts**

| Impact Topic | No Action: Continuation of Existing Management Conditions | Alternative A | Alternative B | Alternative C | Preferred Alternative |
|---|---|---|---|---|---|
| RMD | | | | | |
| **Vegetation** | | | | | |
| **Manning Camp** | Beneficial, local, short- and long-term, and negligible to minor. | Beneficial, long-term, site-specific, and negligible. | Beneficial, long-term, site-specific, and negligible to minor. | Beneficial, long-term, site-specific, and negligible. | Beneficial, local, short- and long-term, and minor. |
| **Southern Boundary** | Adverse, short- and long-term, site specific, and minor. | Adverse, long-term, site-specific, and minor. | Adverse, long-term, site-specific and negligible to minor. | Adverse, long-term, site-specific, and minor. | Adverse, long-term, site-specific, and minor. |
| **Cactus Forest** | Adverse, local, short- and long-term, and minor to moderate. | Adverse, short- and long-term, local, and minor. | Beneficial, long-term, site-specific and negligible. | Adverse, short- and long-term, local, and negligible. | Beneficial, long-term, site-specific and negligible. |
| **Foothills and Mountains** | Beneficial, local, short- and long-term, and negligible. | Beneficial, local, short- and long-term, and negligible. | Beneficial, local, short- and long-term, and negligible. | Beneficial, local, short- and long-term, and negligible. | Beneficial, local, short- and long-term, and negligible. |
| **Cumulative Impacts** | Adverse, long-term, local, and moderate. When combined with other past, present, and foreseeable future actions, the No Action alternative would provide a small incremental increase in overall cumulative impacts. | Adverse, long-term, local, and moderate. Actions under alternative A would provide a small incremental increase in overall cumulative impacts. | Adverse, long-term, local, and moderate. Actions under alternative B would provide a small incremental increase in overall cumulative impacts. | Adverse, long-term, local, and moderate in the RMD. Actions under alternative C would provide a small incremental increase in overall cumulative impact. | Adverse, long-term, local, and moderate. The preferred alternative would provide a small incremental increase in overall cumulative impacts. |
| **Wildlife and Wildlife Habitat** | | | | | |
| **Manning Camp** | Beneficial, local, long-term, and negligible. | Beneficial, local, long-term, and negligible. | Beneficial, local, long-term, and negligible. | Beneficial, local, long-term, and negligible. | Beneficial, local, long-term, and negligible. |
| **Southern Boundary** | Adverse, local, long-term and negligible to minor. | Beneficial, local, long-term, and minor. | Beneficial, local, long-term, and minor. | Beneficial, local, long-term, and minor. | Beneficial, local, long-term and minor. |
| **Cactus Forest** | Adverse, long-term, local, and minor. | Beneficial, local, long-term, and minor. | Beneficial, local, long-term, and minor. | Beneficial, local, long-term, and minor. | Beneficial, local, long-term, and minor. |
| **Foothills and Mountains** | Adverse, local, long-term, and negligible. | Adverse, local, long-term, and negligible. | Adverse, local, long-term, and negligible. | Adverse, local, long-term, and negligible. | Adverse, local, long-term, and negligible to minor. |
| **Cumulative Impacts** | Adverse, regional, long-term, moderate impacts on wildlife. The No Action alternative would provide a slight incremental increase to the overall cumulative impacts. | Adverse, regional, long-term, and moderate. This alternative would provide no incremental increase to overall cumulative impacts. | Adverse, regional, long-term, and moderate. This alternative would provide no incremental increase to overall cumulative impacts. | Adverse, regional, long-term, and moderate. This alternative would provide no incremental increase to the overall cumulative impacts. | Adverse, regional, long-term, and moderate. This alternative would provide no incremental increase to the overall cumulative impacts. |
| **Threatened, Endangered, and Rare and Protected Wildlife Species** | | | | | |
| **Mexican Spotted Owl** | Mexican spotted owl may be affected, but it is not likely to be adversely affected. | Mexican spotted owl may be affected, but it is not likely to be adversely affected. | Mexican spotted owl may be affected, but it is not likely to be adversely affected. | Mexican spotted owl may be affected, but it is not likely to be adversely affected. | Mexican spotted owl may be affected, but it is not likely to be adversely affected. |
| **Yellow-billed cuckoo** | Yellow-billed cuckoo may be affected, but it is not likely to be adversely affected. | Yellow-billed cuckoo may be affected, but it is not likely to be adversely affected. | Yellow-billed cuckoo may be affected, but it is not likely to be adversely affected.. | Yellow-billed cuckoo may be affected, but it is not likely to be adversely affected. | Yellow-billed cuckoo may be affected, but it is not likely to be adversely affected. |
| **Lesser Long-Nosed Bat** | Lesser long-nosed bat may be affected, but it is not likely to be adversely affected. | Lesser long-nosed bat may be affected, but it is not likely to be adversely affected. | Lesser long-nosed bat may be affected, but it is not likely to be adversely affected. | Lesser long-nosed bat may be affected, but it is not likely to be adversely affected. | Lesser long-nosed bat may be affected, but it is not likely to be adversely affected. |
| **Gila Topminnow** | If the Gila topminnow were to be re-introduced, it may be affected, but it would not likely be adversely affected. | If the Gila topminnow were to be re-introduced, it may be affected, but it would not likely be adversely affected. | If the Gila topminnow were to be re-introduced, it may be affected, but it would not likely be adversely affected. | If the Gila topminnow were to be re-introduced, it may be affected, but it would not likely be adversely affected. | If the Gila topminnow were to be re-introduced, it may be affected, but it would not likely be adversely affected. |
| **American Peregrine Falcon** | Adverse, site-specific, short-term and negligible. | Beneficial, site-specific, long-term and negligible. | Adverse, site-specific, short-term, and negligible. | Beneficial, site specific, long term and negligible. | Adverse, site specific short term and negligible. |
| **Cactus Ferruginous Pygmy-Owl** | Adverse, site specific short term and negligible. | Adverse, site specific, short and long term and negligible. | Adverse, site-specific, short- and long-term, and negligible. | Adverse, site-specific, short- and long-term, and negligible. | Adverse, site-specific, short- and long-term, and negligible. |

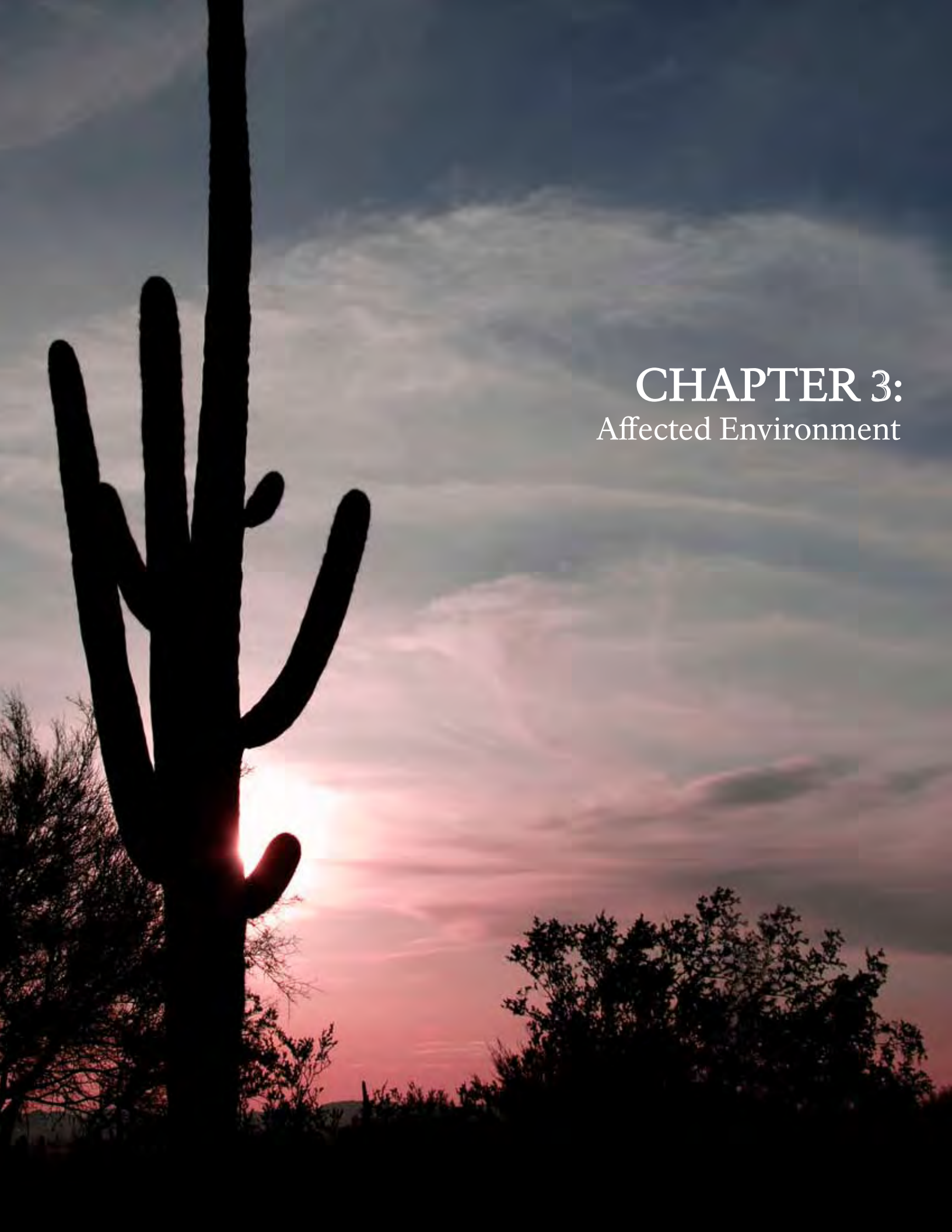
| Impact Topic | No Action: Continuation of Existing Management Conditions | Alternative A | Alternative B | Alternative C | Preferred Alternative |
|---|---|---|---|---|---|
| **Cumulative Impacts** | No noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species. | No noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species. | No noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species. | No noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species. | No noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species. |
| **Soil** | | | | | |
| **Manning Camp** | Adverse, long-term, site-specific and moderate. | Adverse, long-term, site-specific, and negligible. | Adverse, long-term, site-specific, and moderate. | Adverse, long-term, site-specific, and negligible. | Adverse, long-term, site-specific, and moderate. |
| **Southern Boundary** | Adverse, long-term, site-specific, and moderate. | Adverse, short- and long- term, site-specific, and moderate. | Adverse, short- and long- term, site specific, and moderate. | Adverse, short- and long-term, site-specific, and moderate impacts. | Adverse, short- and long- term, site-specific, and moderate. |
| **Cactus Forest** | Adverse, long-term, site-specific, and moderate. | Beneficial, long-term, site-specific, and minor. | Beneficial, long-term, site-specific, and minor. | Beneficial, long-term, site-specific, and minor. | Beneficial, long-term, site-specific, and moderate. |
| **Foothills and Mountains** | Adverse, long-term, site-specific, and moderate. | Adverse, long-term, site-specific, and moderate. | Adverse, long-term, site-specific, and moderate. | Adverse, long-term, site-specific, and moderate. | Adverse, long-term, site-specific, and moderate. |
| **Cumulative Impacts** | Adverse, long-term, site-specific, and moderate. When combined with other past, present, and foreseeable future actions, the No Action alternative would provide a slight incremental increase to overall cumulative impacts. | Adverse, long-term, site-specific, and moderate. When combined with other past, present, and foreseeable future actions, the alternative would provide a small incremental increase to overall cumulative impacts. | Adverse, long-term, site-specific and moderate. When combined with other past, present, and foreseeable future actions, the alternative would provide a small incremental increase to overall cumulative impacts. | Adverse, long-term, site-specific, and moderate. When combined with other past, present, and foreseeable future actions, the alternative would provide a small incremental increase to overall cumulative impacts. | Adverse, long-term, site-specific and moderate. When combined with other past, present, and foreseeable future actions, the alternative would provide a small incremental increase to overall cumulative impacts. |
| **Cultural** | | | | | |
| **All Planning Areas** | Adverse, local, long-term, and moderate impacts on archeological resources. | Adverse, site-specific, long-term, and negligible to minor. | Adverse, site-specific, long-term, and negligible to minor. | Adverse, site-specific, long-term, and negligible to minor. | Adverse, site-specific, long-term, and negligible to minor. |
| **Cumulative Impacts** | Adverse, local, long-term and moderate. The No Action alternative would provide a small incremental impact to the overall cumulative impacts. | Adverse, local, long-term and moderate. Alternative A would provide a small incremental impact to the overall cumulative impacts. | Adverse, local, long-term and moderate. Alternative B would provide a small incremental impact to the overall cumulative impacts. | Adverse, local, long-term, and moderate. Alternative A would provide a small incremental impact to the overall cumulative impacts. | Adverse, local, long-term, and moderate. Alternative A would provide a small incremental impact to the overall cumulative impacts. |
| **Wilderness Values** | | | | | |
| **Manning Camp** | Beneficial, site-specific, long-term, and minor. | Beneficial, site-specific, long-term, and minor. | Beneficial, site-specific, long-term, and minor. | Beneficial, site-specific, long-term, and minor. | Beneficial, site-specific, long-term, and minor. |
| **Southern Boundary** | Adverse, minor, site-specific, and long-term. | Beneficial, site-specific, long-term, and minor. | Beneficial, site-specific, long-term, and negligible. | Beneficial, site-specific, long-term, and minor | Beneficial, site-specific, long-term, and minor. |
| **Cactus Forest** | Adverse, site-specific, long-term, and moderate. | Beneficial, site-specific, long-term, and minor. | Beneficial, site-specific, long-term, and minor. | Beneficial, site-specific, long-term, and minor. | Beneficial, site-specific, long-term, and minor. |
| **Foothills and Mountains** | Adverse, localized, long-term, and minor. | Adverse, localized, long-term, and minor. | Adverse, localized, long-term, and minor. | Adverse, localized, long-term, and minor. | Adverse, localized, long-term, and minor. |
| **Cumulative Impacts** | Adverse, regional, long-term, and moderate because the effects of this alternative would provide only a small incremental impact to overall cumulative impacts. | Adverse, regional, long-term, and moderate because the effects of this alternative would provide only a small incremental impact to overall cumulative impacts. | Adverse, regional, long-term, and moderate because the effects of this alternative would provide only a small incremental impact to overall cumulative impacts. | Adverse, regional, long-term, and moderate because the effects of this alternative would provide only a small incremental impact to overall cumulative impacts. | Adverse, regional, long-term, and moderate because the effects of this alternative would provide only a small incremental impact to overall cumulative impacts. |
| **Visitor Use and Experience** | | | | | |
| **Manning Camp** | Adverse, localized, long-term, and negligible. | Adverse, localized, long-term, and negligible. | Adverse, localized, long-term, and negligible. | Adverse, localized, long-term, and negligible. | Adverse, localized, long-term, and negligible. |
| **Southern Boundary** | Adverse, localized, long-term, and minor. | Beneficial, localized and regional, long-term, and moderate impact. | Beneficial, localized, long-term, and negligible. | Beneficial, localized and regional, long-term, and moderate impact. | Beneficial, localized and regional, long-term, and moderate impact. |
| **Cactus Forest** | Adverse, site-specific, long-term, and moderate. | Adverse, localized, long-term, and minor to moderate. | Adverse, localized, long-term, and minor to moderate. | Adverse, localized, long-term, and minor to moderate. | Beneficial and adverse, localized, long-term, and minor to moderate. |
| **Foothills and Mountains** | Adverse, localized, long-term, and minor. | Adverse, localized, long-term, and minor. | Adverse, localized, long-term, and minor. | Adverse, localized, long-term, and minor. | Adverse, localized, long-term, and minor. |

| Impact Topic | No Action: Continuation of Existing Management Conditions | Alternative A | Alternative B | Alternative C | Preferred Alternative |
|---|---|---|---|---|---|
| **Cumulative Impacts** | Adverse, regional, long-term, and moderate. The No Action alternative would provide a small incremental impact to overall cumulative impacts. | Adverse, regional, long-term, and moderate. This alternative would provide a small incremental impact to overall cumulative impacts. | Adverse, regional, long-term, and moderate. This alternative would provide a small incremental impact to overall cumulative impacts. | Adverse, regional, long-term, and moderate. This alternative would provide a small incremental impact to overall cumulative impacts. | Adverse, regional, long-term, and moderate. This alternative would provide a small incremental impact to overall cumulative impacts. |
| **Park Management and Operations** | | | | | |
| **Manning Camp** | Adverse, localized, short- and long-term, and moderate. | Beneficial, site-specific, short- and long-term and minor. | Adverse, localized, short- and long-term, and moderate. | Beneficial, site-specific, short- and long-term and minor. | Adverse, localized, short- and long-term, and moderate. |
| **Southern Boundary** | Adverse, localized, short- and long-term, and moderate. | Adverse, short- and long-term, local, and moderate. | Adverse, long-term, site-specific, and negligible. | Adverse, short- and long-term, local, and moderate. | Adverse, short- and long-term, local, and moderate. |
| **Cactus Forest** | Adverse, localized, short- and long-term, and moderate. | Beneficial, site-specific, short- and long-term, and moderate. | Beneficial, site-specific, short- and long-term, and moderate. | Beneficial, site-specific, short- and long-term, and moderate. | Beneficial, site-specific, short- and long-term, and moderate. |
| **Foothills and Mountains** | Adverse, localized, short- and long-term, and moderate. | Adverse, localized, short- and long-term, and moderate. | Adverse, localized, short- and long-term, and negligible. | Adverse, localized, short- and long-term, and moderate. | Adverse, localized, short- and long-term, and moderate. |
| **Cumulative Impacts** | Adverse, local, long-term, and moderate. The No Action alternative would provide a small incremental impact to overall cumulative impacts | Beneficial, site-specific and local, short- and long-term, and negligible. This alternative would provide a small incremental impact to overall cumulative impacts. | Adverse, site-specific and local, short- and long-term, and minor to moderate. This alternative would provide a small incremental impact to overall cumulative impacts. | Adverse, site-specific and local, short and long-term, and moderate. This alternative would provide a small incremental impact to overall cumulative impacts. | Adverse, site-specific and local, short and long-term, and minor to moderate. This alternative would provide a small incremental impact to overall cumulative impacts. |

| **Impact Topic** | **No Action: Continuation of Existing Management Conditions** | **Alternative A:** | **Alternative B:** | **Preferred Alternative** |
|---|---|---|---|---|
| **TMD** | | | | |
| **Vegetation** | | | | |
| **Northeast Corner** | Beneficial, local, long-term, and minor. | Beneficial, long-term, local, and negligible. | Beneficial, long-term, local, and negligible. | Beneficial, long-term, local, and negligible. |
| **Northwest** | Adverse, site-specific, long-term, and minor. | Beneficial and adverse, long-term, local, and negligible to minor | Beneficial and adverse, long-term, local, and negligible to minor | Beneficial and adverse, long-term, local, and negligible to minor. |
| **East Boundary** | Adverse, site-specific, long-term, and minor. | Beneficial, long-term, site-specific, and minor. | Beneficial, long-term, site-specific, and minor. | Beneficial, long-term, site-specific, and minor. |
| **South Central** | Beneficial, local, short- and long-term, and minor. | Adverse, long-term, site-specific, and minor. | Adverse, long-term, site-specific, and minor. | Adverse, long-term, site-specific, and minor. |
| **Cumulative Impacts** | Adverse, long-term, local, and moderate. The No Action alternative would provide a small incremental increase to overall cumulative impacts. | Adverse, long-term, local, and moderate. Actions under alternative A would provide a small incremental increase to overall cumulative impacts. | Adverse, long-term, local, and moderate. Alternative B would provide a small incremental increase to overall cumulative impacts. | Adverse, long-term, local, and moderate. Actions under the preferred alternative would provide a small incremental increase to overall cumulative impacts. |
| **Wildlife** | | | | |
| **Northeast Corner** | Beneficial, local, long-term, and negligible. | Beneficial, local, long-term, and negligible. | Beneficial, local, long-term, and negligible. | Beneficial, local, long-term, and negligible. |
| **Northwest** | Adverse, site-specific, long-term, and negligible. | Adverse, local, long-term, and minor. | Adverse, local, long-term, and minor. | Adverse, local, long-term, and minor. |
| **East Boundary** | Adverse, site-specific, long-term, and negligible. | Beneficial, local, long-term, and minor. | Beneficial, local, long-term, and negligible. | Beneficial, local, long-term, and minor. |
| **South Central** | Beneficial, local, long-term, and negligible. | Beneficial and adverse, local, long-term, and minor. | Adverse, local, long-term, and negligible. | Adverse, local, long-term, and negligible. |
| **Cumulative Impacts** | Adverse, regional, long-term, moderate impact on wildlife. The No Action alternative would provide a slight incremental increase to the overall cumulative impacts. | Adverse, regional, long-term, and moderate. This alternative would provide no incremental increase to the overall cumulative impacts. | Adverse, regional, long-term, and moderate. This alternative would provide no incremental increase to the overall cumulative impacts. | Adverse, regional, long-term, and moderate. This alternative would provide no incremental increase to the overall cumulative impacts. |

| Impact Topic | No Action: Continuation of Existing Management Conditions | Alternative A | Alternative B | Alternative C | Preferred Alternative |
|---|---|---|---|---|---|
| **Threatened and Endangered Species** | | | | | |
| **Lesser Long-Nosed Bat** | Lesser long-nosed bat may be affected, but it is not likely to be adversely affected. | Lesser long-nosed bat may be affected, but it is not likely to be adversely affected. | Lesser long-nosed bat may be affected, but it is not likely to be adversely affected. | | Lesser long-nosed bat may be affected, but it is not likely to be adversely affected. |
| **Cactus Ferruginous Pygmy-Owl** | Adverse, site-specific short-term, and negligible. | Adverse, site-specific short-term, and negligible. | Adverse, site-specific, short-term, and negligible. | | Adverse, site-specific, short-term, and negligible. |
| **Cumulative Impacts** | When combined with other past, present, and foreseeable future actions, the No Action alternative would provide no noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species. | When combined with other past, present, and foreseeable future actions, the alternative would provide no noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species. | When combined with other past, present, and foreseeable future actions, the alternative would provide no noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species. | | When combined with other past, present, and foreseeable future actions, the alternative would provide no noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species. |
| **Soils** | | | | | |
| **Northeast Corner** | Adverse, localized, long-term, minor. | Beneficial, long-term, site-specific, and minor. | Beneficial, long-term, site-specific, and minor. | | Beneficial, long-term, site-specific, and minor. |
| **Northwest** | Adverse, site-specific, long-term, minor | Adverse, long-term, site-specific, and minor. | Adverse, long-term, site-specific, and minor. | | Adverse, site-specific, long-term, and minor. |
| **East Boundary** | Adverse, localized, long-term, and minor. | Beneficial, long-term, site-specific, and minor. | Beneficial, long-term, site-specific, and minor. | | Beneficial, long-term, site-specific, and minor. |
| **South Central** | Adverse, long-term, site-specific, and minor. | Beneficial, long-term, site-specific, and moderate. | Beneficial, long-term, site-specific, and moderate. | | Beneficial, long-term, site-specific, and moderate. |
| **Cumulative Impacts** | Adverse, long-term, site-specific, and minor. This alternative would provide a small incremental impact to overall cumulative impacts. | Adverse, long-term, site-specific, and minor. This alternative would provide a small incremental impact to overall cumulative impacts | Adverse, long-term, site-specific, and minor. This alternative would provide a small incremental impact to overall cumulative impacts. | | Adverse, long-term, site-specific, and minor. This alternative would provide a small incremental impact to overall cumulative impacts. |
| **Cultural** | | | | | |
| **All Planning Areas** | Adverse, local, long-term and moderate. | Adverse, site-specific, long-term, and negligible to minor. | Adverse, site-specific, long-term, and minor. | | Adverse, site-specific, long-term, and minor. |
| **Cumulative Impacts** | Adverse, local, long-term, and moderate. The No Action alternative would provide a small incremental impact to the overall cumulative impacts. | Adverse, local, long-term, and moderate. Alternative A would provide a small incremental impact to the overall cumulative impacts. | Adverse, local, long-term, and moderate. Alternative B would provide a small incremental impact to the overall cumulative impacts. | | Adverse, local, long-term, and moderate. The preferred alternative would provide a small incremental impact to the overall cumulative impacts. |
| **Wilderness Values** | | | | | |
| **Northeast Corner** | No impacts. | Beneficial, localized, long-term, and minor. | Beneficial, localized, long-term, and minor. | | Beneficial, localized, long-term, and minor. |
| **Northwest** | Beneficial, localized, long-term, and negligible. | Adverse, localized, long-term, and minor. | Adverse, localized, long-term, and minor. | | No impacts. |
| **East Boundary** | No impacts. | Beneficial, localized, long-term, and minor. | Beneficial, localized, long-term, and minor. | | Beneficial, localized, long-term, and minor. |
| **South Central** | Beneficial, localized, long-term, and moderate. | Adverse, localized, long-term, and negligible. | Adverse, localized, long-term, and negligible. | | Adverse, localized, long-term, and negligible. |
| **Cumulative Impacts** | Adverse, regional, long-term, and moderate. The No Action alternative would provide a small incremental impact to overall cumulative impacts. | Adverse, regional, long-term, and moderate. This alternative would provide only a small incremental impact to overall cumulative impacts. | Adverse, regional, long-term, and moderate. This alternative would provide only a small incremental impact to overall cumulative impacts. | | Adverse, regional, long-term, and moderate. This alternative would provide only a small incremental impact to overall cumulative impacts. |
| **Visitor Use and Experience** | | | | | |
| **Northeast Corner** | Adverse, localized, long-term, and moderate. | Beneficial, localized, long-term, and moderate. | Beneficial, localized, long-term, and moderate. | | Beneficial, localized, long-term, and moderate. |
| **Northwest Corner** | Adverse, localized, long-term, and minor. | Beneficial, localized, long-term, and moderate. | Beneficial, localized, long-term, and moderate. | | Adverse and beneficial, localized, long-term, and minor to moderate. |

| Impact Topic | No Action: Continuation of Existing Management Conditions | Alternative A | Alternative B | Alternative C | Preferred Alternative |
|---|---|---|---|---|---|
| **East Boundary** | Adverse, localized, long-term, and minor. | Beneficial and adverse, localized, long-term, and minor to moderate. | Beneficial, localized, long-term, and moderate effects. | | Beneficial, localized, long-term, and moderate. |
| **South Central** | Beneficial, localized, long-term, and minor. | Beneficial, localized, long-term, and moderate. | Beneficial, localized and regional, long-term, and moderate. | | Adverse and beneficial, localized, long-term, and minor to moderate. |
| **Cumulative Impacts** | Adverse, regional, long-term, and moderate. The No Action alternative would provide a small incremental impact to overall cumulative impacts. | Adverse, regional, long-term, and moderate. This alternative would provide a small incremental impact to overall cumulative impacts. | Adverse, regional, long-term, and moderate. This alternative would provide a small incremental impact to overall cumulative impacts. | | Adverse, regional, long-term, and moderate. This alternative would provide a small incremental impact to overall cumulative impacts. |
| **Park Management and Operations** | | | | | |
| **Northeast Corner** | Adverse, localized, short- and long-term, and moderate. | Adverse, local, long-term, and negligible. | Adverse, local, long-term, and negligible. | | Adverse, local, long-term, and negligible. |
| **Northwest** | Adverse, localized, short- and long-term, and moderate. | Adverse, local, short- and long-term, and moderate. | Adverse, local, short- and long-term, and moderate. | | Adverse, local, short, and long-term, and moderate. |
| **East Boundary** | Adverse, localized, short- and long-term, and moderate. | Adverse, local, long-term, and moderate. | Adverse, local, long-term, and moderate. | | Adverse, local, long-term, and moderate. |
| **South Central** | Adverse, localized, short- and long-term, and moderate. | Beneficial, local, long-term, and negligible. | Adverse, local, long-term, and negligible. | | Adverse, local, long-term, and negligible. |
| **Cumulative Impacts** | Adverse, local, long-term, and moderate. The No Action alternative would provide a small incremental impact to overall cumulative impacts. | Adverse, regional, long-term, and moderate. This alternative would provide a small incremental impact to overall cumulative impacts. | Adverse, regional, long-term, and moderate. This alternative would provide a small incremental impact to overall cumulative impacts. | | Adverse, local, long-term, moderate. This alternative would provide a small incremental impact to overall cumulative impacts. |



# CHAPTER 3:
## Affected Environment

# Chapter 3: Affected Environment

## Introduction

The "Affected Environment" describes existing conditions for those elements of the environment that would be affected by the implementation of alternatives considered in this Environmental Assessment (EA). The natural environment components addressed include vegetation, wildlife and wildlife habitat, species of special concern, soils, water quality and quantity. The cultural environment includes archeological resources, historic structures, and cultural landscapes. Human environmental components include visitor use and experience, wilderness values, and park management and operations. Impacts for each of these topics are analyzed in "Chapter 4: Environmental Consequences."

## Natural Resources

### Vegetation Types

The Rincon Mountain District (RMD) 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, at higher elevations, with mixed conifer forests 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 (TMD) includes desert scrub, desert grassland, and desert xeroriparian plant associations, which exhibit many similarities to their counterparts in the Rincon Mountains. Many plant communities present in the RMD are absent in the TMD because the highest point in the Tucson Mountains is 4,687 feet.

Table 4 details the vegetation types, characteristics and common species within these districts.

**Table 4: Vegetation Types by District**

| Rincon Mountain District | | | |
|---|---|---|---|
| Vegetation Type | Location | Characteristics | Common Species |
| Sonoran Desertscrub | Occurs from the lowest elevations (2,700 feet) to about 5,200 feet | Large number of cacti and provides drought-tolerant habitat for many deciduous trees and shrubs. | Common Overstory – foothills paloverde (*Parkinsonia microphylla*), saguaro (*Carnegiea gigantea*), ocotillo (*Fouquieria splendens*), and velvet mesquite (*Prosopis velutina*).<br><br>Common Understory – triangle-leaf bursage (*Ambrosia deltoidea*), brittlebush (*Encelia farinosa*), various cholla species (*Opuntia versicolor/phaeacantha/leptocaulis/arbuscula*), fishhook cactus (*Mammillaria microcarpa*), fishhook barrel cactus (*Ferocactus wislizenii*), Mexican crucillo (*Condalia warnockii*), Berlandier's wolfberry (*Lycium berlandieri*), desert hackberry (*Celtis pallida*), creosote bush (*Larrea tridentata*), Sangre de Cristo (*Jatropha cardiophylla*), whitethorn and catclaw acacia (*Acacia constricta/greggii*), and fairy duster (*Calliandra eriophylla*).<br><br>Problematic Exotic Plants<br>Red brome (*Bromus rubens*), redstem filaree (*Erodium cicutarium*), Sahara mustard (*Brassica tournefortii*), Malta starthistle (*Centaurea melitensis*), fountain grass (*Pennisetum setacum)*, and buffelgrass (*Pennisetum ciliare*). |
| Desert Grassland | Patches of grassland occur from 4,000 to 5,000 feet | Characterized by the presence and dominance of numerous warm-season, perennial bunch grasses. 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. These patches vary greatly in species composition but are characterized by the presence of numerous perennial grasses. | Common grasses are; tanglehead (*Heteropogon contortus*), various gammas (*Bouteloua curtipendula/radicosa/hirsuta/repens*), lovegrass (*Eragrostis intermedia/lehmanniana),* green sprangletop (*Diplachne dubia*), cane bluestem (*Bothriochloa barbinodis*), bullgrass (*Muhlenbergia emersleyi*), Texas bluestem (*Schizachyrium cirratum*), crinkleawn (*Trachypogon secundus*), bristly wolfstail (*Lycurus setosus*), curlymesquite (*Hilaria belangeri*), Arizona cottontop (*Digitaria californica*) and woolyspike balsamscale (*Elyonurus barbiculmis*).<br><br>Shrubs, cacti, succulents and trees include; ocotillo, Arizona rosewood (*Vauquelinia californica*), shindagger (*Agave schottii*), desert spoon (*Dasylirion wheeleri*), beargrass (*Nolina microcarpa*), desert cholla and prickly pear (*Opuntia versicolor/phaeacantha*), Wright's beebrush (*Aloysia wrightii*), wait-a-minute (*Mimosa buincifera),* fairy duster, firecracker bush (*Bouvardia ternifolia*), Thurber's cotton (*Gossypium thurberi*), kidneywood (*Eysenhardtia orthocarpa*), bastardsage (*Erigonum wrightii*), pineleaf milkweed (*Asclepias linaria*), coralbean (*Erythrina flabelliformis*), Palmer's agave (*Agave palmeri*), veiny brickellbush (*Brickellia venosa*), turpentine |

**Table 4: Vegetation Types by District**

| | | | |
|---|---|---|---|
| | | | bush (*Ericameria laricifolia*), Sangre de Cristo, Velvet Mesquite, Mexican blue oak (*Quercus oblongifolia*), juniper (*Juniperus deppeana/erythrocarpa*), Graham's nipple cactus (*Mammillaria grahamIi var. olivaei*), pincushion cactus (*coryphantha vivipara* var*. bisbeeana*) and MacDougal's nipple cactus (*mammillaria heyderi* var. *macdougalii*).<br><br><u>Problematic Exotic Plants</u><br>Problematic exotics present in this plant community include Lehmann's (*Eragrostis lehmanniana*), Boer love (*Eragrostis chloromelas*), and buffelgrass . Lehmann's lovegrass has invaded thousands of acres of grassland in other natural areas in southern Arizona and is found in the park. |
| Pine/Oak Woodland | Occurs from 4,400 to 6,100 feet | The woodland (also known as interior chaparral) describes a diverse, heterogeneous community type that ranges from near-100% cover stands of 10 to 20-foot-tall pines and evergreen oaks, to more open pinyon/juniper woodland, to chaparral-like stands of shrubby lower-stature oak. The understory is rich in herbs and grasses at lower elevations and decreases with increasing elevation and canopy closure. The heterogeneous structure of this association contributes to its particularly high diversity of both forbs and grasses. | Pines and evergreen oaks, open pinyon/juniper woodland, shrubby manzanita, silktassel. Other important elements in the shrub layer include mountain yucca, beargrass, lemonade berry, shin dagger, and occasional succulents like cholla, prickly pear, and agave.<br><br>Emory oak (*Quercus emoryi*) and Arizona white oak (Quercus arizonica) dominate at the lower elevational limits. Alligator juniper (*Juniperus deppeana)* and Mexican pinyon (*Pinus cembroides*) gain dominance with increasing elevation.<br><br>The shrub layer is frequently very dense and is composed of pointleaf manzanita (*Arctostaphylos pungens*) and Pringle manzanita (*Arctostaphylos pringlei)*, Wright's silktassel (*Garrya wrightii*), mountain yucca (*Yucca schottii*), beargrass, several Chollas and Agave species and wait-a-minute bush. Grasses include many species of deergrass *(Muhlenbergia* spp.), spear grass (*Stipa*), lovegrass (*Eragrostis*), and grama. (*Bouteloua*) to name a few. |
| Pine/Oak Forest | Occurs from 5,300 to 8,000 feet | This association is the most variable at the higher elevations in the Rincon Mountains and covers a wider elevational belt than any other forest or woodland association in the range. 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 The understory is poorly developed where the canopy is dense but richer in species and density where the | Tree species include; Ponderosa pine (*Pinus ponderosa*), Southwestern white pine (*Pinus strobiformis*), Chihuahua pine (*Pinus leiophylla*), Mexican Pinyon, netleaf oak (*Quercus rugosa*), Arizona white oak, silverleaf oak (*Quercus hypoleucoides*), alligator juniper, Arizona madrone (*Arbutus arizonica*) and emory oak.<br><br>The shrub layer varies in species and density depending on elevation. At higher elevations snowberry (*Symphoricarpos oreophilus*), Wilcox's barberry (*Berberis wilcoxii*), Schott's yucca (*Yucca schotii*), New Mexico raspberry (*Rubus neomexicanus*), rhamnaceae (*Ceanothus fendleri*) and coffee berry (*Rhamnus californicus*) occur.<br><br>Lower in elevation pointleaf manzanita and adobe yampah (*Perideridia* |

**Table 4: Vegetation Types by District**

| | | | |
|---|---|---|---|
| | | canopy is open. 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. | *pringlei*), beechleaf frangula (*Rhamnus betulifolia*), prairie acacia (*Acacia angustissima*), beargrass, wait-a-minute bush and Wright's silktassel occur.<br><br>Grasses include screwleaf muhly (*Muhlenbergia virescens*), muttongrass (*Poa fendleriana*), prairie junegrass (*Koeleria cristata*), panic grass (*Panicum bulbosum*), pine dropseed (*Blepharoneuron tricholepis*), Arizona wheatgrass (*Elymus arizonicus*), beal (*Stipa pringlei*) and pinyon ricegrass (*Piptochaetium fembriamtum*). |
| Ponderosa Pine Forest | Occurs from 6,000 to 8,666 feet | Ponderosa pine is dominant in this association, sometimes forming pure stands. 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. | Ponderosa pine is dominant in the overstory, with Southwestern white pine and Gambel's oak (*Quercus gambelii*) as subdominants. The shrub layer is composed of scattered snowberry, Rock spiraea (*Holodiscus dumosus*), Arizona honeysuckle (*Lonicera arizonica*) and rhamnaceae. Dominant herbs and grasses are screwleaf muhly, white mountain sedge (*Carex geophylla*), sneezeweed (*Dugaldia hoopsii*) and Wooton's ragwort (*Senecio wootonii).* |
| Mixed-Conifer Forest | Occurs from 7,000 to 8,666 feet | In contrast to the ponderosa pine forest, the mixed-conifer forest is comparatively lush and more diverse. On the north slopes of Mica Mountain, the canopy is closed with low branches draped with lichen. On the north slope of Rincon Peak, the association is frequently patchy with open areas dominated by herbs. | The shrub understory consists of scattered patches of snowberry, mountain spray, Arizona honeysuckle, and raspberry.<br><br>Douglas fir (*Pseudotsuga menziesii)* is the dominant in the overstory, with Ponderosa Pine, Southwestern white pine, Gambel's Oak, New Mexico locust (*Robina neomexicana*) and white fir (*Abies concolor*) as subdominants.<br><br>The shrub layer consists of patches of mountain snowberry with scattered Rock spiraea, Arizona honeysuckle and New Mexico raspberry. Hoptree (*Ptelea trifoliate*) is locally abundant in the shrub layer on Rincon Peak. |
| Vegetation Communities – Mixed in with Major Vegetation Types | | | |
| Mountain Wet Meadow | Occurs from 7,402 to 8,666 feet | Occurs near springs. Dominant species are largely various species of sedges, grasses, and rushes. | Various sedge family *Cyperaceae*, grass family *Poaceae* and rush family *Juncaceae*. |
| Mountain Dry Meadow | Occurs at 8,500 feet | 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. | Mountain muhly (*Muhlenbergia Montana*), fringed brome (*Bromus ciliatus*), and rough bentgrass (*Agrostis scabra*) dominate this association. Large stands of bracken fern (*Pteridium aquilinum*) also occur, usually with perennial western sneezeweed (*Dugaldia hoopesii*) and a range of annual forbs and grasses including poaceae (*Blepharoneuron*), spear grass, and (*Poa)* dominate this association.<br><br><u>Problematic Exotic Plants</u><br>Disturbed stands of these ferns may be invaded by sheep sorrel (*Rumex* |

**Table 4: Vegetation Types by District**

| | | | |
|---|---|---|---|
| | | | *acetosella*), cheatgrass (*Bromus tectorum*), and Kentucky bluegrass (*Poa pratensis*). |
| Riparian Woodland and Riparian Forest | Occurs above 5,000 feet | Riparian woodland is highly variable in species composition, typically supporting not only riparian obligate species but also nonriparian species normally found at higher elevations. 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. The understory varies depending on water availability and denseness of canopy. | Dominant riparian-obligate trees include Arizona sycamore (*Platanus wrightii*), Goodding's willow (*Salix gooddingii/irrorata*), velvet ash (*Fraxinus velutina*), Arizona walnut (*Juglans major*), Arizona white oak, Alligator juniper and Fremont cottonwood (*Populus fremontii*).<br><br>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 (*Rhamnus californica /ilicifolia*).<br><br>Riparian forest and woodland support a diverse array of grasses (*Poaceae*), sedges (*Cyperaceae*), and rushes (*Juncaceae*). Arizona alder (*Alnus oblongifolia*), boxelder (*Acer negundo*), and coyote willow (*Salix exigua*) are common.<br><br><u>Problematic Exotic Plants</u><br>Bermuda grass (*Cynodon* spp.), giant reed (*Arundo donax*), Johnson grass (*Sorghum halepense*), rabbitsfoot grass (*Polypogon monspeliensis*), tamarisk (*Tamarix* spp.*),* and wild oats (*Avena fatua*). |
| Xeroriparian | 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. 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. | Overstory – Velvet mesquite, desert hackberry, whitethorn and catclaw acacia, Fremont cottonwood, and blue paloverde.<br><br><u>Problematic Exotic Plants</u><br>Fountain grass and buffelgrass are problematic in these communities. |
| Tucson Mountain District | | | |
| Vegetation Type | Location | Characteristics | Common Species |
| Sonoran Desertscrub | Throughout the Tucson Mountains from 2,130 to 4,687 feet | Different vegetation associations are found in different sites within this range. Cacti and other drought-tolerant species provide habitat for many deciduous trees and shrubs. In the foothills, paloverde and saguaro cactus are the dominant species. Creosote bush and jojoba are found with | Creosote bush with or without triangle-leaf bursage associations are found on lower elevation sites (2132–2624 f eet) that are flatter, with fine-grained soils. Associations containing saguaro and other associated species such as Foothills Palo Verde (*Cercidium microphyllum*) and/or Ironwood (*Olneya tesota*) are found at higher elevations (2132 –4757 feet), on bajadas and rocky slopes with alluvial soils, with a dense understory of sub-shrubs, the greatest density consisting of triangle-leaf |

**Table 4: Vegetation Types by District**

| | | | |
|---|---|---|---|
| | | other mixed shrubs and intergraded with Desert Grassland. | bursage, Brittlebush and cacti. At higher elevations (2624–4757 feet) on rocky, north-facing slopes, jojoba (*Simmondsia chinensis*) is found with other mixed shrubs and intergraded with Desert Grassland.<br><br><u>Problematic Exotic Plants</u><br>Red brome, redstem filaree, Sahara mustard, Malta starthistle, fountain grass, and buffelgrass. |
| Desert Grassland | Patches of grassland occur from 3,691 to 4,687 feet | Characterized by the presence and dominance of numerous warm-season, perennial bunch grasses. | Perennial grass species include: Tanglehead, sideoats grama *(Bouteloua curtipendula) / hirsuta / repens,* Lehmann's Lovegrass*)* Plain's Lovegrass *(Eragrostis intermedia),* Herter bluestem *(Bothrichloa barbinoides), Curly mesquite (Hilaria berlangeri),* and Arizona cottontop.<br><br>Other associated perennial species include: Jojoba, ocotillo, Shindagger, Fairy Duster, Sangre de Cristo, and Velvet Mesquite.<br><br><u>Problematic Exotic Plants</u><br>Lehmann's and Boer love grasses. |
| Vegetation Communities – Mixed in with Major Vegetation Types | | | |
| Desert Riparian Scrub | Lower elevation floodplains and drainages | These communities are generally found in lower elevation floodplains and drainages, are linear in structure because they follow drainageways, and as such, are somewhat more mesic than immediately adjacent vegetation communities. 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. | Overstory – Velvet Mesquite, Desert Hackberry, catclaw acacia / whitethorn acacia, and Blue Palo Verde (*Cercidium floridum)*.<br><br><u>Problematic Exotic Plants</u><br>Fountain grass is problematic in these communities. |

Source: NPS 2008; N. Kline, Saguaro National Park, pers. comm. 2006

## Wildlife

Wildlife in Saguaro National Park is diverse, reflecting the park's ecologically strategic location. The RMD 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 RMD, while the TMD has lost desert bighorn and white-tailed deer.

### Desertscrub

Wildlife in the lower elevations of the RMD and TMD 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. The TMD is lower in elevation (2,180 feet at the lowest), flatter, and sandier than the RMD, 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 RMD. Urbanization and development increasingly surround both districts. Habitat fragmentation is a serious threat to the long-term viability of larger terrestrial vertebrate populations.

### 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. Wildlife species more typical of southern Arizona’s “sky islands” include black bear, white-tailed deer, porcupine, tree squirrel, eastern cottontail, Mexican spotted owl, northern goshawk, zone-tailed hawks, white tailed coati, 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 intermountain 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 RMD 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 (pygmy owl). These species are all of special management concern nationally, statewide, and/or locally, primarily due to dwindling numbers and habitat.

Water sources in the RMD that continue to contain water during drought periods (generally a few tinajas within larger drainages, but also some short reaches of Chimenea and in upper portions of 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.

### Invasive Animals

Animals that are not native to the Sonoran desert also pose a threat to native species. Many of these benefit from habitat in the urban developed areas that surround both districts or from the activities of people. Of particular concern are: bullfrogs, crayfish, goldfish, other aquarium fish, feral cats, domestic dogs, cattle, Abert's squirrels (which were introduced to the Catalina Mountains to improve hunting) and Africanized honeybees. All of these species can compete with native species or modify habitat so that it is no longer suitable for native species.

## Threatened, Endangered, and Rare and Protected Wildlife Species

According to the U.S. Fish and Wildlife Service (USFWS) "Listed, Proposed and Candidate Species for Pima County" dated April 8, 2008, there are 18 federally listed threatened, endangered, or candidate species in Pima County, Arizona. These include the following:

- Eleven wildlife species (Desert pupfish, Gila chub, Huachuca water umbel, Kearney blue star, masked bobwhite, Nichol Turk's head cactus, Pima pineapple cactus, Sonoran pronghorn, southwestern willow flycatcher, Acuna cactus and Sonoran mud turtle), which are typically found in habitats that do not occur in Saguaro National Park;
- Jaguars and ocelots, which have been extirpated from the park;
- Chiricahua leopard frogs, which are typically found in habitats that do occur in Saguaro National Park but are not known to occur in the Park; and
- four species (Lesser long-nosed bat, Mexican spotted owl, Yellow-billed cuckoo, and the Gila topminnow) which are known to occur or have occurred in the Saguaro National Park.

A detailed discussion of these four species follows.

Lesser long-nosed bat (Leptonycteris curasoae yerbabuena) federally endangered — both districts.

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, southern Arizona, and New Mexico (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; they 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 USFWS as federally endangered, primarily due to loss of roosting habitat and vulnerability to disturbance of maternity colonies and other roosting sites (Shull 1988).

This species is presumed to be foraging in the dense saguaro stands of both districts early in the summer and perhaps using agave flowers found at higher elevations (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 TMD, this species has never been documented in the district (Sidner 1991, Wolf and Dalton 2003).

***Mexican spotted owl (Strix occidentalis lucida) federally threatened — Rincon Mountain District only.*** The Mexican spotted owl is one of three spotted owl subspecies and is listed as threatened by both the USFWS and the Arizona Game and Fish Department (AGFD) (USFWS 1995b; 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 owls are resident in the RMD. Protected Activity Centers (PACs) have been established for all known territories, which have been occupied every year they have been surveyed since 1992, through sometimes by only one bird or by a non-breeding pair. In February 2001, the USFWS designated much of the RMD as critical habitat for the Mexican spotted owl.

***Yellow-billed cuckoo (Coccyzus americanus) federal candidate — Rincon Mountain District only.*** The yellow-billed cuckoo was designated by the USFWS as a candidate species for listing under the Endangered Species Act (ESA) in 2001. 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 RMD, it is considered a transient and potential breeder.

***Gila topminnow (Poeciliopsis occidentalis occidentalis) federally endangered — Rincon Mountain District only, extirpated.*** The Gila topminnow is a small live-bearing minnow listed as endangered in 1967. Historically, they inhabited many of the larger streams and rivers and their tributaries in the Gila Basin. Preferring quiet warm waters with slow currents and dense aquatic vegetation, Gila topminnow typically occupied the shallow margins of main river channels, backwaters, and natural springs close to rivers or tributaries. They appeared to follow classic metapopulation dynamics, with populations expanding and contracting as rivers and streams ebbed and flowed during drought and flood cycles (Weedman and Young 1995). Habitat changes induced by humans, particularly of aquatic environments (i.e., the construction of dams, introduction of nonnative fish and other predators and or competitors, drainage of swamps and cienegas, and the degradation of aquatic habitats from ground water pumping and other land use practices) decimated this species. Gila topminnows are now reduced to 10 widely separated, isolated populations (Weedman and Young 1997).

The Gila topminnow is considered extirpated in Saguaro National Park. However, the one RMD site at which they were known to occur in the past is recommended for potential "additional management action or restocking" (USFWS, Arizona Ecological Services Field Office, pers. comm. August 7, 1997) although it is not designated Critical Habitat for the species.

## Rare and Protected Wildlife Species

Seventeen federal or state-listed "species of special concern" or "sensitive species" 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 the pygmy owl.

### Plants

There are no plant species currently listed as threatened or endangered within the park, 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

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 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 TMD slopes are shallow, coarsely textured, and well-drained, and soils of the bajadas are alluvial (NPS 1991a). 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. Table 5 describes the soil series present in both districts.

Impacts on soils start with destruction of surface organic matter and compaction of soil. Most impacts on soils in recreational areas result from trampling. The direct weight loads of hikers, backpackers, horses, and bicycles impose considerable stress on soils. Trampling results in a loss of organic matter, making soils more prone to the additional impacts that follow, including compaction and reduced water infiltration. Some sections of trail experience greater degrees of impacts depending on soil composition, slope, trail design, climate, and existing trail conditions.

Compaction increases surface runoff, which in turn greatly increases the potential for erosion. Erosion is the most serious impact on soils because it is irreversible (Hammitt et al. 1998). Although some surface erosion will result from nearly all types of trails, excessive surface erosion is frequently encountered when trails are improperly designed and constructed (Lopez et al. 2001).

**Table 5: Soil Series Characteristics**

| Soil Series | Characteristics | Erosion Potential | Revegetation Potential |
|---|---|---|---|
| Rincon Mountain District | | | |
| Anklam-Cellar-Rock Outcrop Complex, 15% to 55% slopes | This series is 40% Anklam extremely gravelly sandy loam that has slope gradients of 25% to 50%, 25% Cellar extremely gravelly sandy that has slope gradients of 15% to 55%, and 20% Rock outcrop. The soils and the areas of Rock outcrop are intricately intermingled; however, a higher percentage of Rock outcrop is in areas near the hilltops and mountaintops. | Moderate to Severe | Severe limitations due to risk of erosion |
| Anthony Fine Sandy Loam, 0% to 3% slopes | This is very deep, well-drained soil on nearly level floodplains formed in mixed alluvium. | Slight | Severe limitations due to shallow, droughty, or stony soil |
| Arizo-Riverwash Complex, 0% to 3% slopes | This series is on nearly level flood plains. This unit is 50% Arizo gravelly loamy sand and 20% Riverwash. Arizo soils and Riverwash occupy bar and channel flood plain physiography. Arizo soils are on higher-lying bars, and Riverwash are in the channel bottoms. | Moderately to very high (especially during flash floods) | Severe or very severe limitation due to water |
| Cellar-Lehmans Complex, 5% to 25% slopes | This series is on gently sloping to moderately steep hills and pediments. This unit is 40% Cellar extremely gravelly sandy loam and 25% Lehmans gravelly sandy clay loam. Also in this unit is about 10% Rock outcrop. Cellar soils are on the steeper areas that have gradients of 15% to 25%, and Lehmans' soils are on less sloping saddles that have gradients of 5% to 15%. The Rock outcrop occurs as ledges and boulder piles scattered throughout the unit. | Slight to moderate | Severe limitations due to shallow, droughty, or stony soil |
| Cellar-Rock Outcrop Complex, 30% to 65% slopes | This series is on steep and very steep hills at the base of very steep mountains. This unit is 60% Cellar extremely gravelly sandy loam and 20% Rock outcrop; these are intricately intermingled. | Very slight to severe | Severe limitations due to risk of erosion |
| Chimenea Very Gravelly Fine Sandy Loam, 5% to 15% slopes. | This very shallow and shallow, well-drained soil is on strongly sloping pediments formed in alluvium and colluvium derived from granite. | Slight | Severe limitations due to shallow, droughty, or stony soil |

**Table 5: Soil Series Characteristics**

| Soil Series | Characteristics | Erosion Potential | Revegetation Potential |
|---|---|---|---|
| Chiricahua-Lampshire Complex, 5% to 15% slopes. | This series is on rolling, low, granitic hills and pediments. It is 50% Chiricahua very gravelly fine sandy loam and 20% Lampshire very gravelly loam. Also in this unit is about 10% Rock outcrop. Chiricahua soils are on gently sloping saddles, and Lampshire soils are on moderately steep shoulders and backslopes. The Rock outcrop occurs as ledges and boulder piles scattered throughout the unit. | Very slight to slight | Severe limitations due to shallow, droughty, or stony soil |
| Cortaro-Rock Outcrop-Faraway Complex, 15% to 45% slopes. | This series is on moderately steep and steep granitic and gneissic hills and mountains. This unit is 40% Cortaro extremely gravelly sandy loam, 20% Rock outcrop, and 15% Faraway extremely gravelly sandy loam. | Very slight to severe | Severe limitations due to risk of erosion |
| Deloro-Rock Outcrop Complex, 15% to 60% slopes | This series is on moderately steep to steep hills and mountains. It is 60% Deloro extremely channery loam that has slope gradients of 15% to 45% and 15% Rock outcrop. Also in this unit is 10% Andrada very gravelly loam. The components of this unit are intricately intermingled. | Very slight to severe | Severe limitations due to risk of erosion |
| Lampshire-Romero-Rock Outcrop Complex, 10% to 65% slopes | This series is on moderately steep to very steep hills and mountains. It is 45% Lampshire very gravelly loam, 20% Romero very gravelly sandy loam, and 15% Rock outcrop. Lampshire soils are on moderately steep to steep backslopes near areas of Rock outcrop that have slope gradients of 10% to 65%, and Romero soils are on moderately steep to steep footslopes that have slope gradients at 10% to 60%. The soils and the Rock outcrop are intricately intermingled; however, a higher percentage of Rock outcrop is in areas near the hilltops and mountaintops. | Very slight to severe | Severe limitations due to risk of erosion |
| Oracle-Romero-Rock Outcrop Complex, 5% to 35% slopes | This series is on hilly granitic pediments and steep hills. It is 30% Oracle very gravelly loam on slopes of 5% to 20%, 25% Romero very gravelly sandy loam on slopes of 10% to 35%, and 20% Rock outcrop. The amount of Rock outcrop varies from about 5% in some areas to as much as 30% to 40% in other areas. The components of this unit are intricately intermingled. | Very slight to moderate | Severe limitations due to shallow, droughty, or stony soil |

**Table 5: Soil Series Characteristics**

| Soil Series | Characteristics | Erosion Potential | Revegetation Potential |
|---|---|---|---|
| Palos Verdes-Jaynes Complex, 2% to 8% slopes | This series is on gently sloping relict fan terraces. It is 40% Palos Verdes gravelly sandy loam and 35% Jaynes gravelly sandy loam. Also in this unit is about 10% Delthorny extremely cobbly fine sandy loam. Thecomponents of this unit are intricately intermingled. | Slight to moderately high | Severe limitations that reduce the choice of plants or that require very careful management or are due to shallow, droughty, or stony soil |
| Pantano-Granolite Complex, 5% to 25% slopes | This series is on rolling and hilly pediments at the base of mountains. It is 40% Pantano extremely gravelly loam and 35% Granolite extremely gravelly sandy loam. Also in this unit is about 10% Rock outcrop. The components of this unit are intricately intermingled. | Very slight to moderate | Severe limitations due to shallow, droughty, or stony soil |
| Pantano-Rock Outcrop Complex, 25% to 60% slopes | This series is on steep hills and mountains. It is 50% Pantano extremely gravelly loam on slope gradients of 25% to 50% and 25% Rock outcrop. The soils and the areas of Rock outcrop are intricately intermingled; however, a higher percentage of Rock outcrop is in areas near the hilltops and mountains. | Very slight to severe | Severe limitations due to risk of erosion |
| Pinaleno-Stagecoach Complex, 5% to 16% slopes | This series is on strongly sloping fan terraces. It is 40% Pinaleno very cobbly sandy loam and 35% Stagecoach very gravelly sandy loam. Pinaleno soils are on crests and shoulders that have gradients of 5% to 10%. Stagecoach soils are on shoulders and backslopes that have gradients of 5% to 16%. | Very slight to slight | Severe limitations due to shallow, droughty, or stony soil |
| Pinaleno-Stagecoach- Palos Verdes Complex, 10% to 35% slopes | This series is on moderately steep and steep fan terraces and relict fan terraces. It is 35% Pinaleno very cobbly sandy loam, 35% Stagecoach very gravely sandy loam, and 15% Palos Verdes gravelly sandy loam. Pinaleno soils are on shoulders and crests of fan terraces that have gradients of 10% to 35%. Stagecoach are on backslopes of fan terraces that have gradients of 20% to 25%, and Palos Verdes soils are on relict fan terraces that have gradients of 10% to 15%. | Very slight to moderate | Severe limitations due to shallow, droughty, or stony soil |
| Romero-Oracle Complex, 25% to 60% slopes | This series is on steep and very steep granitic hills and mountains. | Very slight to severe | Severe limitations due to risk of erosion |

**Table 5: Soil Series Characteristics**

| Soil Series | Characteristics | Erosion Potential | Revegetation Potential |
|---|---|---|---|
| Spudrock-Boriana Complex, 10% to 35% slopes | This series is on moderately steep and steep gneissic hills and mountains. It is 55% Spurdock very flaggy sandy loam on slope gradients of 15% to 35% and 20% Boriana very flaggy sandy loam on slope gradients of 10% to 35%. Also in this unit is about 10% Rock outcrop occurring as large boulders and ledges. | Very slight to severe | Severe limitations due to shallow, droughty, or stony soil |
| Spudrock-Far-Rock Ourcrop Complex, 25% to 65% slopes | This series is on steep and very steep granitic and gneissic hills and mountains. It is 45% Spudrock very flaggy sandy loam, 20% Far gravelly fine sandy loam, and 15% Rock outcrop. | Very slight to severe | Severe limitations due to risk of erosion |
| Spudrock-Lemmon Complex, 15% to 45% slopes | This series is on moderately steep and steep schist and gneiss hills and mountains. It is 40% Spurdrock very flaggy sandy loam on gradients of 15% to 45% and 30% Lemmon flaggy loam on gradients 15% to 35%. Also this unit is about 10% Rock outcrop that occurs as large boulders and slump blocks. | Very slight to severe | Severe limitations due to risk of erosion |
| Tucson Mountain District | | | |
| Anklam-Cellar-Rock Outcrop Complex, 15% to 55% slopes | Reference description in RMD | | |
| Arizo-Riverwash Complex, 0% to 3% slopes | Reference description in RMD | | |
| Chimenea Very Gravelly Fine Sandy Loam, 5% to 15% slopes. | Reference description in RMD | | |
| Chimenea-Cellar-Rock Outcrop Complex, 15% to 50% slopes. | This series is on moderately steep and steep hills. It is 40% Chimenea very gravelly fine sandy loam that has gradients of 15% to 30%, 20% Cellar extremely gravelly sandy loam that has gradients of 15% to 50%, and 15% Rock outcrop. The components of this unit are intricately intermingled. | Slight to severe. | Severe limitations due to risk of erosion |
| Hayhook Sandy Loam, 1% to 5% slopes | This is very deep and well-drained soil on gently sloping fan terraces incised by narrow drainageways formed in alluvium derived from granite. | Slight to moderately high | Severe limitations due to shallow, droughty, or stony soil |
| Hayhook –Sahuarita Complex, 1% to 5% slopes | This series is on gently sloping intermediate and low fan terraces incised by narrow drainageways. It is 45% Hayhook sandy loam and 30% Sahuarita very gravelly fine sandy loam. The components of this unit are intricately intermingled. | Very slight to moderately high | Severe limitations due to shallow, droughty, or stony soil |

**Table 5: Soil Series Characteristics**

| Soil Series | Characteristics | Erosion Potential | Revegetation Potential |
|---|---|---|---|
| Nahda Very Cobbly Loam, 2% to 8% slopes | This moderately deep to a lime-cemented hardpan and well-drained soil is on gently sloping fan terraces at the base of volcanic hills and mountains formed in alluvium derived dominantly from volcanic rock. | Very slight to slight | Severe limitations due to shallow, droughty, or stony soil |
| Palos Verdes-Jaynes Complex, 2% to 8% slopes | Reference description in RMD | | |
| Pantano-Granolite Complex, 5% to 25% slopes | Reference description in RMD | | |
| Pantano-Rock Outcrop Complex, 25% to 60% slopes | Reference description in RMD | | |
| Pinaleno Very Cobbly Sandy Loam, 1% to 8% slopes | The very deep and well-drained soil is on gently sloping fan terraces formed in mixed alluvium. | Very slight to slight | Severe limitations due to shallow, droughty, or stony soil |
| Pinaleno-Stagecoach Complex, 5% to 16% slopes | This series is on strongly sloping fan terraces. It is 40% Pinaleno very cobbly sandy loam and 35% Stagecoach very gravelly sandy loam. Pinaleno soils are on crests and shoulders that have gradients of 5% to 10%. Stagecoach soils are on shoulders and backslopes that have gradients of 5%to 16%. | Very slight to slight | Severe limitations due to shallow, droughty, or stony soil |
| Pinaleno-Stagecoach- Palos Verdes Complex, 10% to 35% slopes | Reference description in RMD | | |
| Saguaro-Rock Outcrop Complex, 15% to 45% slopes | This series is on moderately steep and steep limestone mountains. It is 45% Saguaro extremely gravelly fine sandy loam and 30% Rock outcrop. The components of this unit are iintricatlely intermingled. | Very slight to severe | Severe limitations due to erosion potential. |
| Stagecoach- Sahuarita Association, 1% to 8% slopes | This series is on gently sloping fan terraces. It is 50% Stagecoach very gravelly sandy loam and 25% Sahuarita very gravelly fine sandy loam. Stagecoach soils are on crests and shoulders with gradients of 3% to 8%, and Sahuarita soils are on lower lateral toeslopes with gradients of 3% to 8%, and Sahuarita soils are on lower lateral toeslopes with gradients of 1% to 3%. The components of the unit are intricately intermingled. | Very slight to slight | Severe limitations due to erosion potential. |
| Tubac Gravelly Loam, 1% to 8% slopes | This very deep and well-drained soil is on broad gently sloping fan terraces shallowly dissected by ephemeral drainages. | Slight | Limitations due to erosion potential. |

## Archeological Resources

The cultural resources of Saguaro National Park and its environs span 8,000 years of human occupation. Approximately 26% of Saguaro National Park has been surveyed for cultural resources including all of RMD below 4,500 feet, which constitutes the Rincon Mountain Foothills Archeological District and is the area of the park with the highest potential for archeological and historic-period sites. About 435 archeological and historic-period sites have been recorded. A sample survey of the uplands at RMD included the trails and developed campsite areas as well as areas where cultural resources might occur. An archeological survey at TMD examined all the new lands, road and trail corridors, developed areas such as the park headquarters and picnic areas, and areas where ground disturbance has been proposed. In addition, an archeological survey at TMD was conducted in areas of previously recorded/reported sites and in areas where the location of sites seems likely.

Prehistoric resources at Saguaro National Park are, for the most part, low visibility artifact scatters that represent campsites, quarries, agricultural sites and villages. Other prehistoric sites include rock art sites, rockshelters, and sites with bedrock grinding features. The historic resources of the park range from abandoned mining and ranching operations to lime kilns, and historic-period trash scatters. The Freeman Homestead and the lime kilns are listed in the Arizona State Register of Historic Places.

As part of the comprehensive trails plan, a study of historic trails was undertaken, Three trails or trail segments in the RMD (Loma Verde and Cactus Forest trails and Garwood Dam Road) and one trail in the TMD (King Canyon Trail) were recommended eligible in whole or in part to the National Register of Historic Places (NRHP). Two of these, the Garwood Dam Road and King Canyon Road, were previously determined eligible in 1994 by the State Historic Preservation Officer (SHPO) dated December 9, 1994, (Arendt 2008). A determination of eligibility for all four trails or trail segments received SHPO concurrence.

Although only about 26% of Saguaro National Park has been surveyed for archeological sites, this sample represents a rather complete archeological inventory in terms of the different types of park landforms and in terms of present and future development of park infrastructure. However, some site-specific surveys may still need to be conducted for *National Historic Preservation Act* (NHPA)compliance for specific purposes (NPS 2008c).

## Historic Structures

A number of historic structures and features are found at Saguaro National Park. In the RMD, these include National Register properties Manning Cabin and Manning Dam located just below Mica Peak and the Civilian Aeronautical Administration (CAA) building in the Madrona Area. The Freeman Homestead is listed on the Arizona State Register of Historic Places.

The contributions of the Civilian Conservation Corps (CCC) to Saguaro National Park can be seen in picnic areas, roads, and water control features throughout the park. The dates of December 22, 1933, through June 21, 1941, mark the CCC’s occupation of the work camp, Camp Pima. Today, adobe ruins and concrete foundations mark the remains of the camp. The rustic structures, roads, and water control features built for the park by the CCC are constructed of native stone. The five CCC picnic areas in TMD, Cam-Boh, Ez-Kim-In-Zin, Mam-A-Gah, Signal Hill, and Sus, generally include ramadas with saguaro rib details as well as picnic tables, benches, fireplaces, and restrooms (NPS 1987: 223–224). The CCC-built Cactus Forest Drive in the RMD exhibits attributes of the NPS rustic architectural style. The design is natural to blend into the landscape. With its stone retaining walls and turnouts with low stone curbing, the Cactus Forest Drive winds through the cactus forest with scenic views and displays of natural features, such as stands of native cacti. On May 18, 2005, Cactus Forest Drive was determined to be eligible for listing in the NRHP as a historic structure with cultural landscape components (Arendt 2008).

### Civilian Aeronautical Administration Building in the Madrona Area

The CAA building in the Madrona Area of the RMD 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 SHPO (Arendt 2008). Distinctive architectural details include window hoods for shade and hip knobs for decoration, giving it a “gingerbread” effect. In the park, the building was used to store tack for packing horses up into the Rincon Mountains.

### Manning Cabin at Manning Camp

Manning Cabin, at Manning Camp, is a log cabin 60 feet by 22 feet with 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-story pattern with gable ends. Manning Camp is reached via trail on foot or by horseback. Manning Cabin was listed in the NRHP on March 31, 1975. The log structure in the cool of the Rincon Mountains was completed by mid-summer 1905. Levi Howell Manning (1864–1935) had it built as a summer retreat from the heat of Tucson. Manning 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 to be the United States Surveyor General for the Arizona Territory in 1893, and in 1905, he began a term as mayor of Tucson. “Manning was the first to build such a cabin retreat in the [park’s] mountains” (NPS 1987). 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 cabin continues to be used as a fire-guard quarters today. Clemensen (NPS 1987), 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 as 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 was determined eligible for listing in the NRHP on December 9, 1994. The small dam near Manning Cabin was built by Levi Howell Manning in 1905 as part of constructing Manning Cabin. Then, as now, its purpose was 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.

### Freeman Homestead

Ruins of the Freeman Homestead represent the last homestead authorized in Tucson in 1929. Today one can see melted adobe walls on a concrete foundation in the shade of a large tamarisk tree. Evidence of the ramada, saguaro rib garage, outhouse, chicken yard, and ocotillo fence have been removed. The site is part of the park’s education program and is listed on the Arizona State Register of Historic Places.

## *Wilderness Values*

## Purpose of Wilderness

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.

## Wilderness at Saguaro National Park

Much of the land in Saguaro National Park (70,905 acres) was formally designated as wilderness in 1976 in accordance with the provisions of the *Wilderness Act* (NPS 2008c). The *Omnibus Wilderness Act* of 1976 specifically names Saguaro National Monument in Arizona as designated wilderness to be administered by the secretary of the interior in accordance with the applicable provisions of the *Wilderness Act*. The *Arizona Wilderness Act* of 1984 also includes legislation designating the Rincon Mountain Wilderness (NPS 1992). Lands have been added to the park since the wilderness designation in 1976; boundary changes took place in 1961, 1976, 1991, and 1994 (NPS 2008c). These are referred to as the expansion areas in this document. Figures 14 and 15 show the designated wilderness boundaries and those lands assessed as suitable for potential wilderness.

The *Wilderness Act*, regulations at 43 CFR 19, NPS *Management Policies 2006*, and *Director's Order 41* require that the NPS review all areas within a park to determine if any meet the criteria laid out in the *Wilderness Act* and NPS *Management Policies 2006*. A wilderness suitability assessment was completed on lands added to the park since 1976, the last designation of wilderness within the park. The lands considered potentially suitable will be formally evaluated as part of a future wilderness study.

The 2008 *General Management Plan* (GMP) zoned designated wilderness as Sensitive Resource, Primitive, or Semi-primitive. This zoning would ensure that wilderness qualities are maintained until a wilderness study is completed on the lands found suitable. The 2008 GMP determined that 4,716 additional acres are suitable for Wilderness designation. NPS lands will be considered suitable for wilderness if they are at least 5,000 acres or of sufficient size to make practicable their preservation and use in an unimpaired condition, and if they possess the characteristics identified in the *Wilderness Act* (NPS 2008c).

**Figure 14: Rincon Mountain District Wilderness Area**

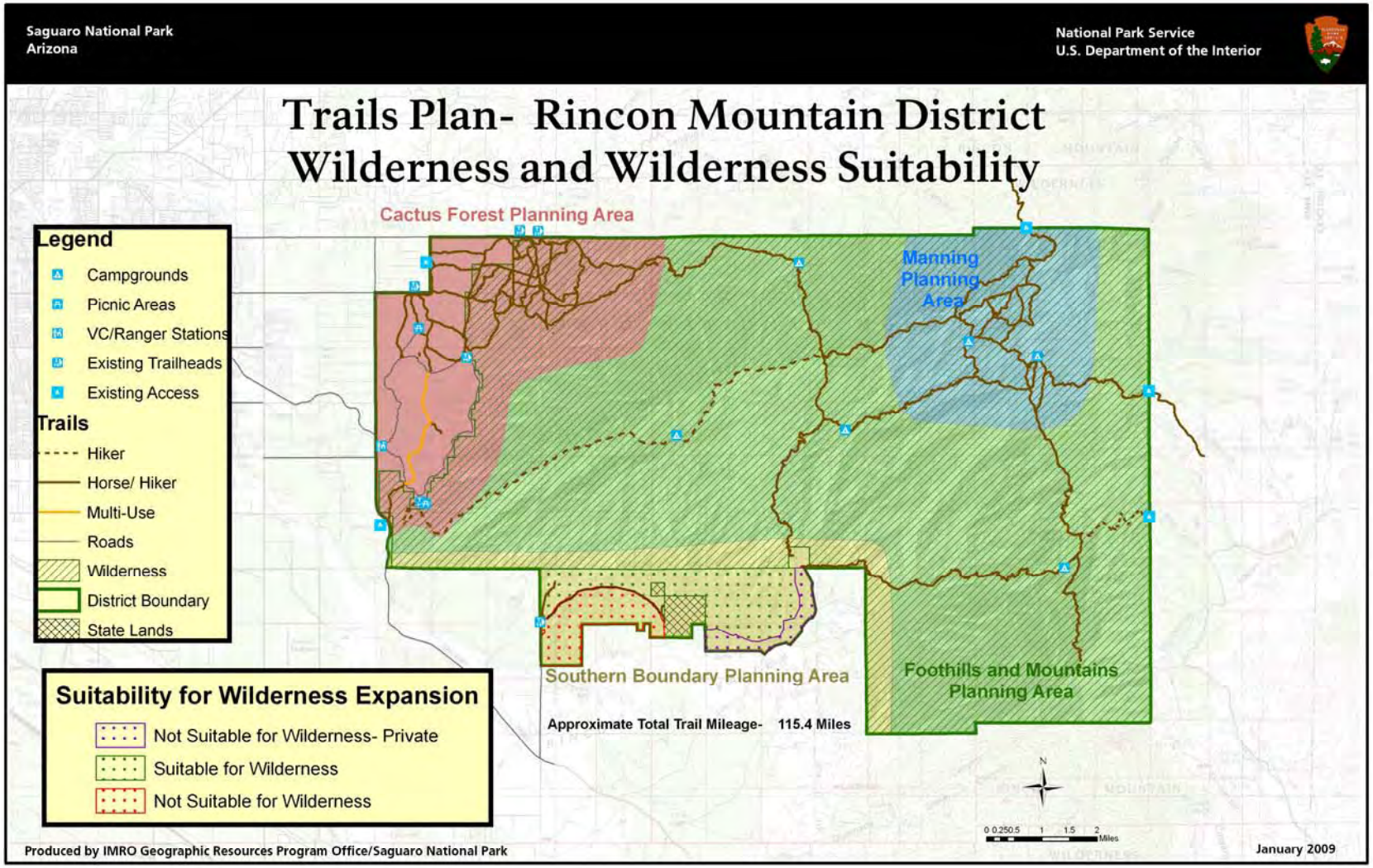
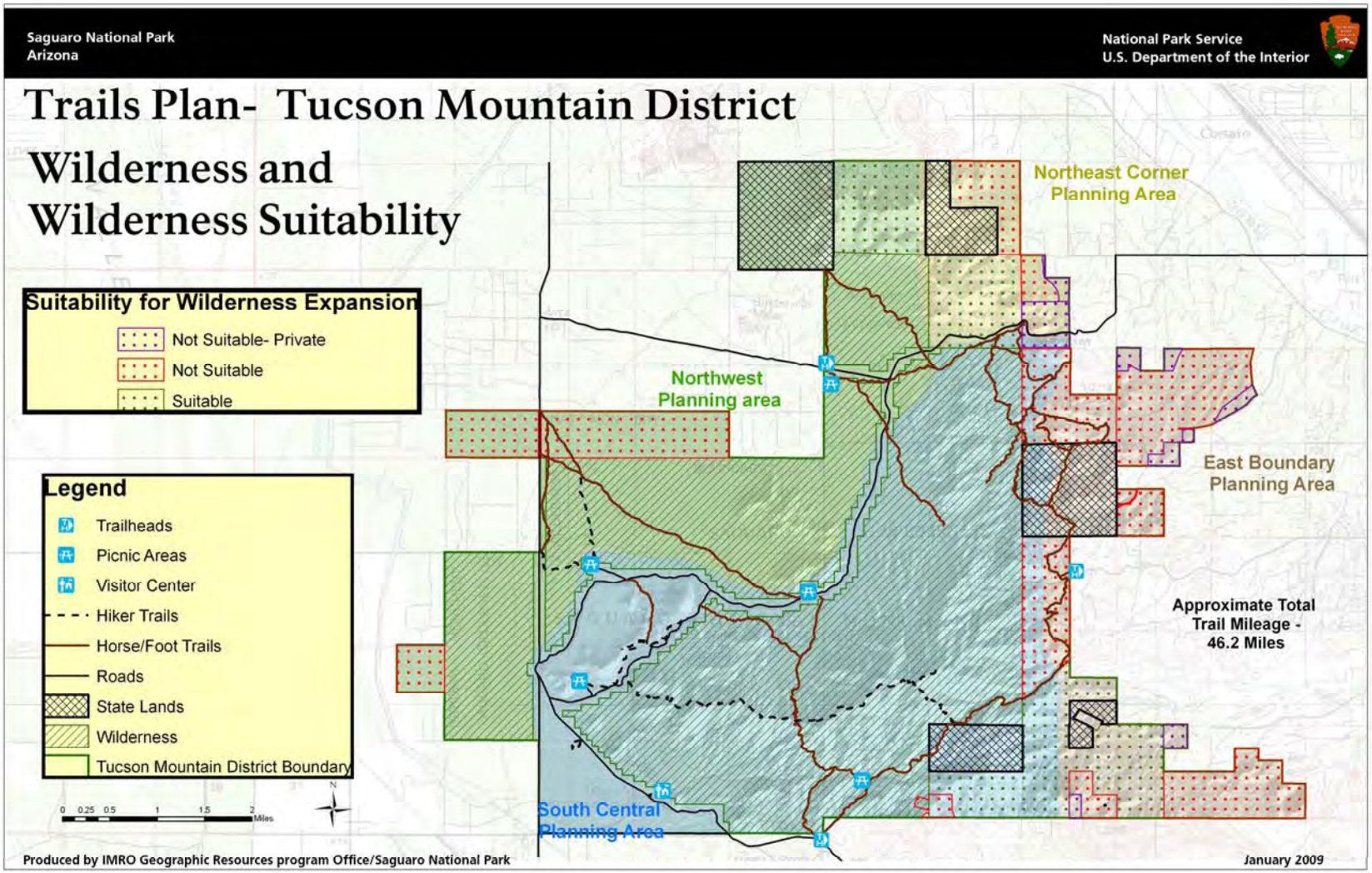


**Figure 15: Tucson Mountain District Wilderness Area**



Saguaro's 2008 GMP lists the following issues related to wilderness (NPS 2008c) at the park:

- 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.
- The high density of trails in some areas of wilderness may not be consistent with wilderness mandates.
- Roads and traffic impact the designated wilderness located on either side of the roads.
- 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*.
- The park's proximity to the growing population of Tucson may make protecting wilderness values, such as quiet and solitude, more difficult.

The *Wilderness Management Plan* lists objectives related to issues and opportunities and objectives related to management actions. Those that are relevant to this plan are listed in table 6 (NPS 1992).

**Table 6: Wilderness Management Plan Objectives**

| Category | Issues and Opportunities Objective | Management Objective | Relevant Management Actions |
|---|---|---|---|
| Recreation | Provide as much solitude and unconfined recreation as possible without degrading the wilderness and other resources. | Provide for a variety of recreation opportunities appropriate in wilderness and at levels to protect resources. Construct the minimum recreation facilities necessary to protect resources. | • Establish a monitoring system at highly used trailheads (Douglas Spring, Cactus Forest) to determine more accurate day use. Work to limit level of use to current level. At less used trailheads, monitor level of use and allow day use to increase unless analysis shows unacceptable change to resources.<br>• Enforce regulations for stock management. |
| Trails and Signs | Provide the transportation system that is necessary to protect and access the wilderness. Provide only the signing that is necessary for resource and personal protection and education. | Provide access to the different opportunity classes (described below) and provide a variety of recreation experiences while protecting wilderness resources. | • Establish trail maintenance standards and maintain trails to them. Maintain all trails to a standard that protects resources.<br>• Level 1 trails (located in Opportunity Class 1) will receive the highest maintenance priority.<br>• Identify trails that may accommodate people with disabilities.<br>• Designate trails that should be limited to foot traffic only. Stock are prohibited on Tanque Verde Ridge, Miller Creek, and Rincon Peak trails. |

| Category | Issues and Opportunities Objective | Management Objective | Relevant Management Actions |
|---|---|---|---|
| Trailheads and Access | Provide legal access to trailheads. Provide trailhead facilities that fit appropriate uses of the trails accessed. | Provide trailhead facilities and obtain legal access to accommodate existing use. Provide trailhead facilities outside wilderness. | • Have a consistent presence at trailheads during high-use periods for purposes of visitor information and education.<br>• Develop a trailhead development plan that addresses parking needs, sanitation facilities, and wilderness information to be provided at each trailhead. |
| Administration and Management | Provide management that protects the wilderness resource and allows for appropriate use by people. Minimize the amount of administrative facilities located within the wilderness. | Minimize adverse effects of administrative activities on wilderness. Develop a joint operations and maintenance plan for the Rincon Wilderness. Develop a monitoring program to ensure that wilderness resources are preserved. Establish a work force to implement the maintenance plan. | • Identify manpower needed to monitor visitor use, trail conditions, and visitor education and enforcement.<br>• Consider removal of the man-made water tanks. Remove old allotment fences. |

## Wilderness Values at Saguaro National Park

Wilderness management in the NPS focuses on the preservation of wilderness character and resources while providing for appropriate use (NPS 1992). 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. The park's purpose statements include the importance of protecting natural quiet in the park, especially in the wilderness areas, as well as providing opportunities to understand and enjoy the park's resources in a manner that is compatible with the preservation of park resources and wilderness character (NPS 2008c).

In addition to an absence of human-produced structures and roads, wilderness is also defined by its natural scenery, natural quiet, and solitude. Currently, park visitors have some opportunities to experience solitude and tranquility in an environment of natural sounds, especially in designated wilderness. The park provides outstanding opportunities for solitude and getting in touch with nature (NPS 2008c).

Park visitors value these opportunities. Many respondents to *Newsletter 1* for the 2007 draft GMP, and the 2003–04 visitor survey, indicated that the wilderness values of the national park, such as naturalness, opportunities for self-discovery, quiet, scenic vistas, and solitude, make the park a unique and special place, and it should be protected for such values. 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. People appreciate the scenery, views, and open space, and the serenity, peace, and relaxation these 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 also suggested that the park provides a needed escape from the region's developing urban environment. Some of the special places in the park's wilderness that people highlighted in their comments included Bridal Wreath Falls, Douglas Spring camping area, the summit of Pink Hill (all located in RMD), and Wasson Peak (located in TMD) (NPS 2008c).

Several 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 about future overuse,

crowding, loss of natural quiet, and interruption of the park's scenic viewsheds. Some respondents expressed concerns over high levels of use and access to certain portions of the park's wilderness. The level of development on trails in wilderness, specifically rock steps, was frequently mentioned as a concern in response to both *Newsletter 1* and the 2003–04 visitor survey (NPS 2008c).

With increasing use levels, demands for new activities, and increasing urbanization along the park boundary, protecting wilderness values is becoming more difficult. As mentioned in "Chapter 1: Purpose and Need for Action," certain areas of the park do not currently meet the description of wilderness. Existing use patterns need to be commensurate with protecting wilderness values, such as natural quiet and solitude, in the high use areas of the wilderness. 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 (NPS 2008c).

## *Visitor Use and Experience*

The *Organic Act* and NPS *Management Policies 2006* direct the NPS to provide visitor enjoyment opportunities that are suited and appropriate to the resources found in the park. 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 (2007). 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 RMD and TMD of Saguaro National Park through mail survey questionnaires distributed at various locations throughout the park. Data was also collected from adult visitors who are park neighbors 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" below) and neighbors that visit the park (referred to as "neighbors"). The study is referred to as the 2003–04 visitor study (DEA 2007).

### Visitor Use and Characteristics

Visitation to Saguaro National Park has generally increased over time, with slight declines in visitation from 1980–81, 1993–96, and 2000–02 (see figure 16). Visitation peaked at 828,000 in 1993 (NPS 2004e). The most recent decline in visitation corresponds with a decline in visitation to the Grand Canyon and other Arizona national parks and monuments as well as other Arizona communities that rely on tourism. There is no clear consensus as to the cause for the decline. A similar decline is also occurring in many national parks around the country (NPS 2007).

Based on the long-term trends and 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 heavily visited 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. The trend in visitation is expected to increase, at least slightly, due to the continuing growth and development of tourism services in the area (NPS 2007).

The typical peak visitation periods are the winter months of January through March (see figure 17) when visitors experience cooler temperatures in the lower elevations, and long hikes in the backcountry become more desirable. By late February, visitors may see and photograph many annual wildflowers. The summer brings higher temperatures and potential intense thunderstorms, which reduces visitation and the length of visitors' stay in the park (NPS 2007).

**Figure 16: Park Visitation 1920–2007**

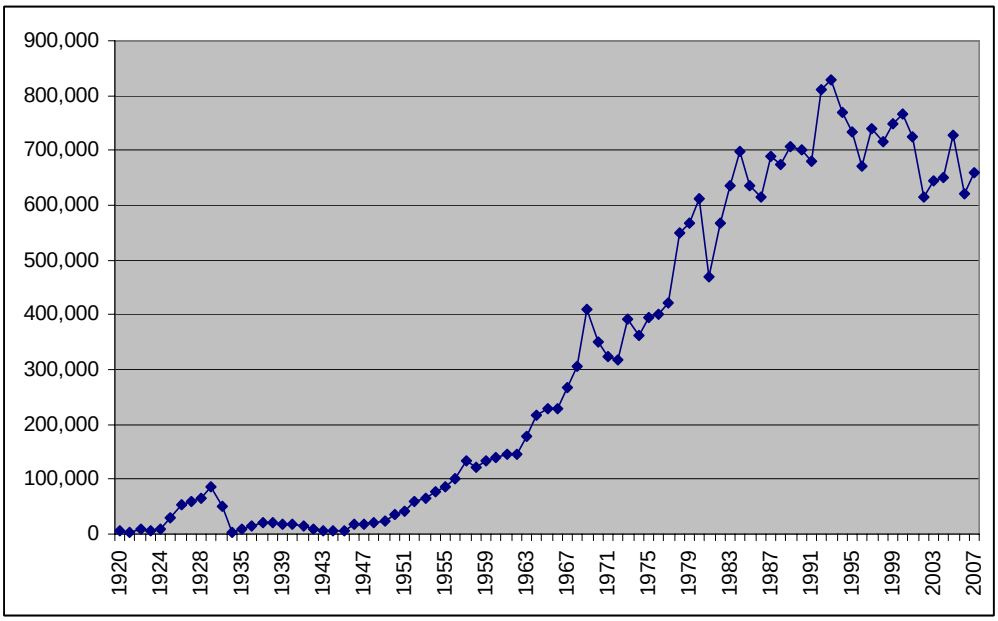
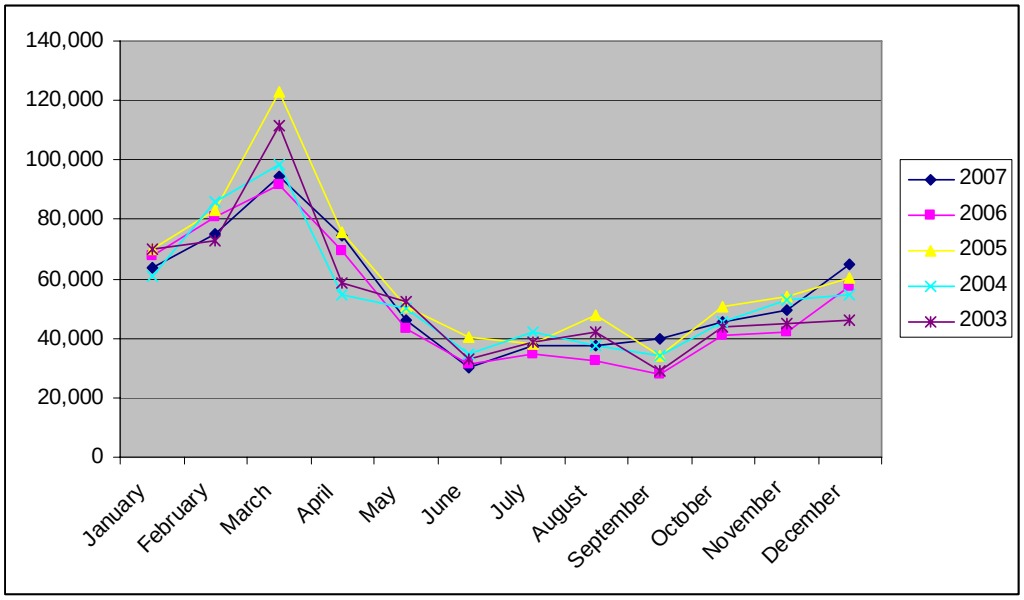



**Figure 17: Visitor Use by Month 2003–2007**



Other relevant visitor characteristics for both districts that were identified during the 2003–04 visitor study (DEA 2006) are summarized in table 7.

**Table 7: Visitor Characteristics for the Park Districts**

| | Rincon Mountain District | Tucson Mountain District |
|---|---|---|
| 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. | Fifty-two percent were from out of state. |
| | 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 times. About 23% had visited 100 or more times. | About 44% of visitors have been to the park between one and five times. About 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. |

The visitor study results identify some distinct differences among visitor populations of the two park districts. First, a slightly larger average group size visits the RMD than the TMD (three versus two, respectively). Also, the RMD is more often a primary destination for visitors and neighbors than the TMD; 70% indicated that the RMD was a primary destination. Visitors to the TMD are much more likely to have a primary destination other than Saguaro National Park due to the proximity of other major attractions in the area. Approximately 56% indicated that this district was a primary destination.

Repeat visitation occurs more often at the RMD than the TMD. Almost 25% of RMD visitors have been to the park 100 or more times, compared to only 10% of TMD visitors. However, a higher percentage of out-of-state and international visitors go to the TMD, likely due to the spectacular stands of saguaro there and the proximity of the other Sonoran Desert attractions, which likely draw more first-time, nonlocal visitors to that district. The RMD seems to attract more local and regional visitation, which is likely due to its proximity to the city of Tucson and that district's extensive and diverse trail system.

## Trail Use

As mentioned in chapter 1, visitors to both districts enjoy auto touring, bird watching, hiking, nature walks, bike riding, horseback riding and wildlife viewing. According to the park's year 2001 strategic planning results, 99% of park visitors reported being satisfied with their visit (NPS 2002a). However, the public expressed concern that overuse of the park and increasing urbanization would threaten the park's qualities of solitude, quiet, and naturalness (NPS 2006b). High densities of visitors are concentrated in certain areas of the park, and commercial tour organizations also bring large groups into the park. The wide variety of recreation activities available on park trails can lead to impacts from noise (discussed under the "Wilderness Values" section), as well as user conflicts (described in more detail below), which can diminish the overall visitor experience.

Most of the respondents to the 2007 draft management plan newsletter 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. The newsletter comments also identified reductions in recreation opportunities, specifically trail closures, as one of respondents' main concerns (NPS 2007). Table 8 shows visitor activities within the park.

Foot travel (hiking and running) was the most activity in both districts. Table 9 shows the trails within the park that receive the highest use and have the highest potential for congestion and parking demand at trailheads. Tables 9 and 10 show the trails that receive the highest use intensity in the park.

**Table 8: Visitor Activities within Saguaro National Park**

| | Rincon Mountain District | | | Tucson Mountain District | | |
|---|---|---|---|---|---|---|
| Mode | Visitors | Neighbors | All | Visitors | Neighbors | Total |
| Hiking | 78.6% | 53.9% | 74.6% | 89.7% | 62.0% | 82.0% |
| Running | 11.7% | 2.7% | 10.3% | 3.9% | 2.5% | 3.5% |
| Mountain Biking | 0.7% | 3.5% | 1.2% | 1.0% | 5.0% | 2.1% |
| Horseback Riding | 5.0% | 22.1% | 7.8% | 1.5% | 15.1% | 5.3% |
| Backpacking/ Camping | 1.9% | 1.9% | 2.5% | 0.5% | 0.5% | 0.7% |

Source: DEA 2007.

**Table 9: Trails Receiving Highest Use**

| | Rincon Mountain District | Tucson Mountain District |
|---|---|---|
| Highest Used Trailheads | • Douglas Spring<br>• Broadway<br>• Wild Horse | • Sendero Esperanza<br>• King Canyon<br>• Hugh Norris |
| Highest Potential for Congestion and Parking Demand | • Douglas Springs trailhead area (via Speedway Boulevard)<br>• Broadway trailhead areas (via Broadway Boulevard)<br>• Visitor Center and Park Headquarters area (via Freeman Road) | • King Canyon trailhead areas (via Kinney Road)<br>• Sendero Esperanza trailhead areas (via Golden Gate Road)<br>• Hugh Norris trailhead areas (via Hohokam Road)<br>• Red Hills Visitor Center area (via Kinney Road) |

Source: DEA 2007

**Table 10: Special Places**

| Rincon Mountain District | Tucson Mountain District |
|---|---|
| • Bridal Wreath Falls | • Wasson Peak |
| • Visitor Center | • Red Hills Visitor Center |
| • Douglas Springs Camping Area | • Hugh Norris-Sendero Esperanza Trail Junction |
| • Bridal Wreath Junction | • Signal Hill |
| • Mica View Picnic Area | • EZ-Kim-In-Zin |
| • Summit of Pink Hill | • Mam-A-Gah Picnic Area |

Source: DEA 2007

Visitors were asked to list special places or experiences they found within the park and to describe the quality of those experiences in the 2003–04 survey, as shown in table 10. For both districts, respondents said that enjoying the natural scenery and views was of primary importance for identifying a special place (DEA 2007).

One of the top three themes of enjoyment for respondents in both units was trail access, which includes a variety of trails and exercise, quality of trails, trail maintenance, and trail signs. Conversely, in the RMD, approximately 17% and 13% of respondents indicated that trail maintenance (including horse/stock manure, trash, rocks, and type of construction) and trail use regulations (including trail access, trail encounters, trail education, and multiuse trails and impacts), respectively, represented the least enjoyed aspects of the park. These themes were not as prevalent in the TMD, where 7% and 5% of respondents least enjoyed trail maintenance and trail use regulations, respectively. However, a higher percentage of respondents had "no complaints" in both districts — 26% for the RMD and 27% in the TMD (DEA 2007).

In the RMD, both visitors and neighbors rated "visitor-created trails" (or social trails) as the second highest potential problem. At the TMD, this was rated the third highest problem. Damage to vegetation and petroglyphs ranked high as issues for both districts, as did finding a parking space. Similarly, the majority of respondents, both visitors and neighbors, supported educating visitors on impacts of off-trail travel, followed by closing social trails for both units (DEA 2007).

Visitors (many of whom are nearby residents) have been demanding increased access to some attraction sites as well as to access from surrounding high-density residential areas. Visitors have also been using roads as trails to visit mines and other attractions. Increased demand has led to an increase in the number of social trails as users find their own way into and through the park. Visitors are also demanding more variety of use, such as increased mountain bike use. There is insufficient parking for horse trailers and lack of connectivity for equestrian use (NPS 2005b). Equestrians are concerned about a system of steps, which they claim to be a safety issue (NPS 2006c). Some all-terrain vehicle (ATV) use occurs on roads, so there is the potential for illegal off-road use in the park (NPS 2005b).

### Hiking

Saguaro National Park's two districts offer more than 185 miles of hiking trails. A hike at the park can be a stroll on a short interpretive nature trail or a multi-day wilderness trek. Both districts offer a variety of hiking trails, and some hiking restrictions apply to both districts including the following:

- Hiking groups are limited to a maximum of 18 persons.
- Because of the sensitivity of the desert environment, the prevalence of cultural sites, and the need for resource protection, hiking off-trail is not permitted below 4,500 feet in the RMD; with the recently approved 2008 GMP, these same restrictions will be applied to the TMD.
- If above 4,500 feet and off-trail hiking is required, the maximum number of persons allowed in an off-trail group is six in RMD and ten in TMD to minimize impact.

As shown in table 10, the majority of visitors and neighbors in both districts went hiking — 75% in the RMD and 82% in the TMD (DEA 2007). Runners represent additional foot traffic on park trails. As mentioned in chapter 1, the majority of the park's trails exist in the RMD, which experiences intense visitor use in the northwest area (known as the Cactus Forest). Approximately 128 miles of trails traverse the desert and mountain areas of the RMD. Several longer hiking trails penetrate the wilderness of the Rincon Mountains and their foothills although few people visit this part of the park because it is accessible only by foot or horseback. Comparatively, there are approximately 43 miles of trails in the TMD. Both districts include state trust lands, which are parcels of land within the park held by the Arizona State Land Department. A State Land Recreational Permit is required to hike in these parcels.

### Backcountry Camping

Camping is prohibited in the TMD. Backcountry camping is allowed at designated camp sites by permit in the Saguaro Wilderness Area in the RMD, which consists of 59,930 acres with six wilderness camping areas that are only accessible by foot or horse using the park's trails. All of the camping areas are at least six miles from the nearest trailhead. Visitors must camp in designated camp sites only. For the last 10

years (1994–2004), camping activity in the RMD 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). As shown in table 10, fewer than 3% of park visitors engage in backcountry camping at the park. To date, there has not been more demand for camping opportunities than supply, and no substantial comments were received on the park's camping opportunities during the scoping process for the 2007 draft GMP (NPS 2007).

### Horseback Riding

Livestock, which includes horses, burros, and mules, may be ridden on designated trails within the park. Access is restricted on some trails due to steep grades, slippery rocky terrain, or conflicts with other user groups. In both districts, stock groups are limited to a maximum of 15 animals.

Stock riding off-trail is prohibited in the RMD, except in washes. Stock users use the Wild Horse and Broadway trailheads to access trails in the Cactus Forest. In the Rincon Valley, trailer parking is available 0.4 mile (0.6 km) south of the Loma Alta trailhead. To protect resources and limit damage, livestock are restricted from certain trails entirely including the following:

- south of the intersection of Carillo and Wild Horse Trails
- Tanque Verde Ridge Trail
- Desert Ecology Trail
- Freeman Homestead Trail
- Miller Creek Trail
- Last ½ mile of Rincon Peak Trail (from hitching rail to summit)
- RMD's Cactus Garden
- First quarter of Douglas Springs Trail

In the TMD, stock are prohibited from off-trail travel. Stock users use Cam Boh, El Camino del Cerro, and Sendero Esperanza trailheads. To protect resources and limit damage, livestock are restricted from certain trails entirely including the following:

- Cactus Garden Trail
- Desert Discovery Trail
- Valley View Overlook Trail
- Signal Hill Petroglyphs Trail
- Hugh Norris Trail
- King Canyon Trail from Sweetwater Trail junction to the Hugh Norris Trail junction
- Cactus Wren Trail south of the Encinas Trail
- Manville Trail from Signal Hill Picnic Area to Manville Road
- Bajada Wash Trail from Valley View Overlook Trail to Sus Picnic Area

As shown in table 10, approximately 8% of visitors to the RMD and 5% to the TMD engage in horseback riding. Substantially more park neighbors engage in horseback riding in both districts than do visitors. During public scoping for the 2007 GMP, equestrians felt that the park is taking away their loop trail opportunities; they do not want out-and-back trails (NPS 2008b).

### Bicycling

Bicycling at Saguaro is limited in terms of opportunities and has been a controversial issue in the past. The NPS reopened the 2.5-mile segment of Cactus Forest Trail in the RMD to bicycle use in September 2003. Bicycling is not permitted on any trail within the TMD. Although all roads within both park districts are also open to bicycle use, Picture Rocks Road (on the north of the TMD) is not recommended for bicycling for safety reasons. As shown in table 11, approximately 1% of park visitors engage in mountain biking at the RMD and 2% at the TMD (NPS 2007).

Many respondents during the scoping process for the 2007 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 (NPS 2007).

**Table 11: Visitor Services and Amenities**

| | Rincon Mountain District | | | Tucson Mountain District | | |
|---|---|---|---|---|---|---|
| | Reduce the Amount | Leave as Is | Add More | Reduce the Amount | Leave as Is | Add More |
| Educational exhibits/signs | 1.0% | 44.4% | 28.6% | 0.4% | 44.5% | 28.8% |
| Hiking trails | 1.7% | 64.4% | 15.8% | 0.7% | 58.7% | 18.2% |
| Access for disabled persons | 0.3% | 34.5% | 9.9% | 0.7% | 34.9% | 10.7% |
| Mountain biking trails | 16.11% | 29.8% | 7.4% | 17.4% | 27.8% | 7.5% |
| Horseback riding trails | 17.9% | 34.4% | 5.8% | 15.3% | 31.0% | 7.1% |

Source: DEA 2007.
Note: Totals do not yield 100% because the “don’t know” category is not included.

### Use by Neighbors

RMD 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 TMD went hiking or walking, followed by scenic driving. Similarly, in the TMD, neighbors represented the largest percentage of horseback riding (15%) and bicycling (3%) activity, and these visitors had the highest participation in running activities (4%) (DEA 2007).

## Opportunities for Orientation, Education, and Interpretation

There are many opportunities for orientation, education, and interpretation within both districts of the park. Numerous guided walks are offered at each visitor center. The Desert Ecology Trail is a paved 0.25-mile wheelchair accessible interpretive loop located near the Mica View Picnic Area. The TMD’s Desert Discovery Trails is also a paved 0.25-mile accessible trail. The Freeman Homestead Nature Trail is a one-mile interpretive loop trail located near the Javelina Picnic Area. During the public scoping period for the 2007 draft management plan, the public suggested increased interpretation of cultural resources; more guided walks; and more signs for mile markers, trail etiquette, and the park’s flora and fauna (NPS 2007).

## Visitor Access, Including Access for Visitors with Disabilities

Each park district has main access points near the main visitor centers. In addition, several trailhead access points around the park boundary provide access to the park's trail systems and day-use picnic areas. Increased access by park neighbors from nondesignated locations along the park's boundary 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 newer expansion areas, to provide much needed access (NPS 2007). However, results of the 2003–04 visitor survey indicate that a majority of both visitors and neighbors do not feel that more entry points are needed. Approximately 47% of visitors and 71% of neighbors of the RMD said no additional access is needed. Approximately 90% of visitors and 69% of neighbors of the TMD said no additional access is needed (table 11; DEA 2007).

When asked during the 2003–04 visitor survey if additional services or amenities were needed at the park, the majority of respondents said "leave as is" for both districts in regards to trail access. For both districts, horseback riding trails and mountain biking trails had the two highest percentages of "reduce the amount." For both districts, educational exhibits or signs received the highest percentage of "add more," followed by hiking trails (table 11; DEA 2007).

The local and regional public expressed interest in a 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 RMD and the east expansion area of the TMD (NPS 2007).

One interpretive trail in each district is accessible by disabled visitors. There was some mention about the need for more universally accessible nature trails in both districts (NPS 2007).

## Visitor Conflicts and Safety

According to NPS *Management Policies 2006*, the NPS will strive to identify recognizable threats to the safety and health of persons and to the protection of property. In addition, the Title 36 CFR 4.30 regulations, which provide for the use of bicycles on designated routes, requires a written determination that the safety of such use on a designated route has been considered (NPS 2002a). Unsafe conditions caused by trail users can, in turn, result in conflicts, as a number of threats to user safety can occur on trails (FHWA 1994).

Respondents to the newsletter for the 2007 draft GMP as well as to the 2003–04 visitor survey mentioned conflicts between different trail user groups, particularly bicyclists and horseback riders. The majority of comments regarding user group conflicts on trails was from visitor survey respondents in the RMD who noted their dislike for the amount of horse manure left on trails. Some comments suggested adding more loop trails, and possibly single-use trails, to alleviate user group conflicts (NPS 2008c).

The 2003–04 survey asked respondents to identify the type and number of encounters they had had with other park users. The highest percentage group of "did not encounter any" was mountain bikers in both units. However, this group ranked third of six for the "disliked them" category at the RMD, and second of six at the TMD. Horseback riders were ranked highest in the "disliked them" category, but were also ranked third of six for the "enjoyed them" category at the RMD. At the TMD, horseback riders were ranked third in the "disliked them" category. Vehicle drivers ranked second under the "disliked them" category (DEA 2007).

Safety issues are primarily related to crowded trailheads. Most visitors use private vehicles to get to and around the park, leading to congestion at trailheads. According to the 2003–04 visitor study, 95% of TMD visitors and 78% of TMD neighbors access the park via automobile. A similar level of automobile access by visitors occurs at the RMD (93%), but the level of access by neighbors using automobiles is much lower (61%), with the other major forms of access being by horse (16%) and walking (16%). At TMD, traffic has been steadily increasing traffic on Picture Rocks Road; this is a commuter road used to access

homes and businesses on the west side of the district. The park is experiencing issues with road maintenance, visitor safety, and wildlife crossings related to area growth (NPS 2008b).

Insufficient parking, particularly in the Cactus Forest area, has led neighbors to express concerns about visitors parking on Speedway and Broadway boulevards (NPS 2005b). The park received comments on the need to improve access at the Broadway and Speedway parking areas, which are associated with trailheads along the RMD 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 (NPS 2008c).

Parking is poorly located and speed limits are inadequate for the high density of visitors to the Cactus Forest Planning Area, particularly at the Douglas Springs, Wildhorse, Broadway, and Irvington access points. The park cannot control speed limits on roads outside its boundary (NPS 2008c).

Adequate signage is important to help ensure the safety of trail users. Park staff believe that signs are inadequate for the complex system of trails in the Cactus Forest, the length of which is deceptive, and which has led visitors to get lost. The park provides no paper maps for visitors to take from the trailhead; the only trail map exists on a board at the trailhead (NPS 2008c).

Some of the park's trails are poorly designed and present safety hazards, such as steep slopes and debris on the trails. Lack of proper trail maintenance in some areas can lead to unsafe trail conditions as well (NPS 2005b). Equestrians and some hikers have expressed safety concerns with rock steps in the Cactus Forest Planning Area; they find the steps difficult to negotiate. Trenches caused by erosion are another potential safety issue; one horse fell while walking in one. Inexperienced equestrians find some of these issues difficult to navigate, resulting in safety concerns (NPS 2008c).

A number of hiking, equestrian, and cycling related accidents occur throughout the park each year. Incident reports indicate that park rangers respond to visitors suffering from heat stroke, heart attacks, broken bones, and insect bites. Cycling-related accidents include broken arms, collar bones, and a pelvis from falls occurring on the Cactus Forest Loop Road, and punctures and lacerations resulting from falls into desert shrubs and cactus (NPS 2002a). In addition, visitors have been using abandoned roads to access old mine sites, which present safety hazards (NPS 2005b). Hiking off-trail also creates safety concerns as visitors are more likely to become lost or injured.

## *Park Operations and Facilities*

### Park Organization

Two districts, the RMD and the TMD — east and west of Tucson, Arizona respectively, make up Saguaro National Park. Both districts comprise 91,440 acres total within park boundaries.

The park is administered by a superintendent and headquarters are located in the RMD.

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 parkwide. Rangers make

routine park visitor contacts to provide orientation and educational information, 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 of ensuring 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, special events, and informal contacts with visitors. This branch is also responsible for supervision of publications and materials that are available at bookstores and sales outlets and that include exhibits and audiovisual media, a website, and electronic media.

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

### Science and Resources 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 parkwide computer system. This division is also responsible for employee housing management.

### 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 inspections of the park vehicle fleet, but vehicles are taken to local vendors for oil changes and other maintenance or repairs. This division is also responsible for Information Technology and the parkwide communications system.

### Fire Management Division

The Fire Management Division is responsible both for firefighting 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 mule program.

## Staffing

Park staffing in 2008 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, increased demands for educational opportunities and outreach to school groups, better enforcement on park roads, the need for general inventorying and monitoring of park resources, and fire management and trail maintenance needs as well as coordination of volunteers, the management of resource and exotic species impacts, and provision of 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 trail maintenance and restoration, trail patrol, natural resource management for exotic plants, animal surveying and monitoring, archeological site monitoring, visitor center staffing, and provision of interpretive programs. The park will continue to invite and accept the valuable service of volunteers. In fiscal year 2007, 333 volunteers donated 19,158 hours, assisting the park with trails (NPS 2008a).

### 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; they also provide administrative space for park staff. Park facilities are typically located in areas that can sustain visitation while protecting park resources and natural systems.

**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.

**Park Roads.** In the RMD 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 TMD 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 TMD 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 Scenic Drive. The Golden Gate Road is a (3.8 mile) graded dirt road that connects a portion of the Bajada Loop Scenic Drive with Picture Rocks Road. Two and a half miles of Sandario Road is within the park boundary and is the main paved north to south route on the western edge of the TMD. Picture Rocks Road is a paved road that crosses the northern portion of the TMD 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 nonrecreationally based travel corridors.

These uses are not fundamental to the purpose of this park, and there are no efficient safeguards to maintain and regulate safe conditions for park visitors and park resources. As a result, excessive high speeds and nonrecreational based 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 RMD for the scenic Cactus Forest Loop Drive. Visitors to the TMD are asked to pay at the Red Hills Visitor Center.

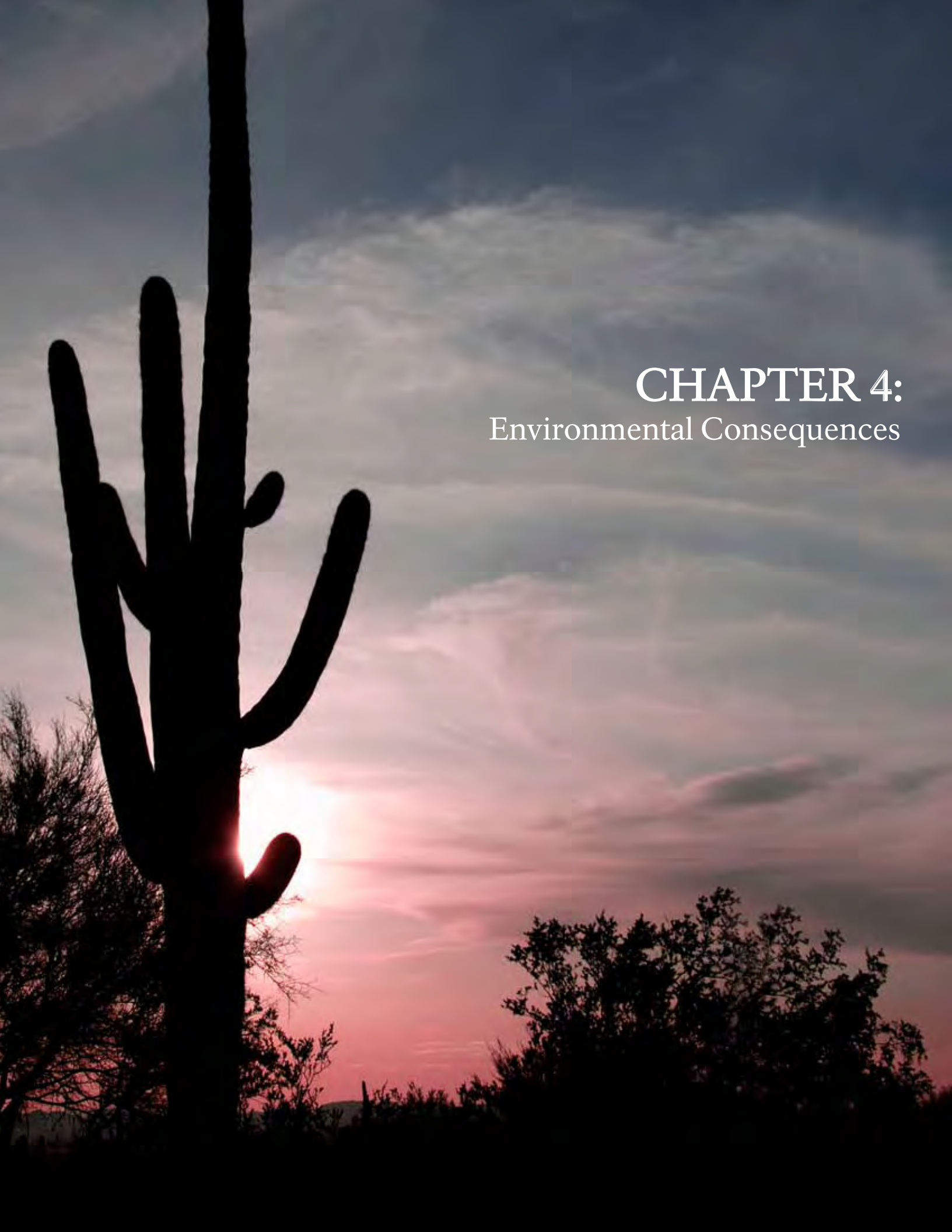
**Parking Areas.** There are 20 official parking areas in the park, 9 in the TMD and 11 in the RMD. Maintained parking areas include trailhead parking, picnic area parking, visitor center parking, and park administration and maintenance area parking. Current parking at the Rincon Mountain Visitor Center 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 RMD 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 TMD, constructed in 1994, and the RMD Visitor Center, constructed in the early 1950s, are staffed by park rangers and offer exhibits, audiovisual programs, 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 RMD Visitor Center is outdated and does not have adequate space for necessary visitor service functions nor does it have staff offices.

**Orientation, Wayside Exhibits, and Interior Exhibits.** Interior exhibits in the Rincon Mountain Visitor Center are outdated and require significant 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 RMD.



# CHAPTER 4:
## Environmental Consequences

# Chapter 4: Environmental Consequences

This "Environmental Consequences" chapter analyzes both beneficial and adverse impacts that would result from implementing any of the alternatives considered in this Saguaro National Park Trails Plan / Environmental Assessment (plan/EA). This chapter also includes a summary of laws and policies relevant to each impact topic, definitions of impact thresholds (e.g., negligible, minor, moderate, and major), methods used to analyze impacts, and the analysis methods used for determining cumulative effects. As required by the Council on Environmental Quality (CEQ) regulations implementing the *National Environmental Policy Act* (NEPA), a summary of the environmental consequences for each alternative is provided in table 3, which can be found in chapter 2. The resource topics presented in this chapter, and the organization of the topics, correspond to the resource discussions contained in chapter 3.

## *Introduction*

## *General Methodology for Establishing Impact Thresholds and Measuring Effects by Resource*

The following elements were used in the general approach for establishing impact thresholds and measuring the effects of the alternatives on each resource category:

- general analysis methods as described in guiding regulations
- basic assumptions used to formulate the specific methods used in this analysis
- thresholds used to define the level of impact resulting from each alternative
- methods used to evaluate the cumulative effects of each alternative in combination with unrelated factors or actions affecting park resources
- methods and thresholds used to determine if impairment of specific resources would occur under any alternative

These elements are described in the following sections.

## General Analysis Methods

The analysis of impacts follows CEQ guidelines and *Director's Order 12* procedures (NPS 2001) and is based on the underlying goal of providing a comprehensive, well-designed, sustainable trail system that offers reasonable access and a variety of visitor trail recreation experiences, consistent with the purpose and significance of the park. This analysis incorporates the best available scientific literature applicable to the region and setting and the actions being considered in the alternatives.

As described in chapter 1, the NPS created an interdisciplinary team to provide important input to the impact analysis. For each resource topic addressed in this chapter, the applicable analysis methods are discussed.

## Assumptions

Several guiding assumptions were made to provide context for this analysis. These assumptions are described below.

### Analysis Period

Goals, objectives, and specific implementation actions needed to manage trails at Saguaro National Park are established for the next 25 years; therefore, the analysis period used for assessing impacts is up to 25 years.

### Geographic Area Evaluated for Impacts

The geographic study area for this plan includes Saguaro National Park in its entirety.

### Duration and Type of Impacts

The following assumptions are used for all impact topics (the terms "impact" and "effect" are used interchangeably throughout this document):

- *Short-term impacts* — Impacts that are temporary, lasting for a year or less following an action.
- *Long-term impacts* — Impacts lasting longer than one year and that could be permanent.
- *Direct impacts* — Impacts directly caused by a trails management action which occurs when and where the action is implemented.
- *Indirect impacts* — Impacts occurring from trails management actions that would occur later in time or farther in distance than when and where the action is implemented.

### Future Trends

Visitor use and demand are anticipated to follow trends similar to recent years. The number of yearly visitors to Saguaro National Park has fluctuated in the past 10 years. Visitation has averaged more than 650,000 from 2004 to 2007. In the absence of notable anticipated changes in facilities or access, a slight increase in visitation is expected over the life of this plan.

## Impact Thresholds

Determining impact thresholds is a key component in applying NPS *Management Policies* and the *Director's Order 12*. These thresholds provide the reader with an idea of the intensity of a given impact within a specific topic. The impact threshold is determined primarily by comparing the effect to a relevant standard based on regulations, scientific literature and research, or best professional judgment. Because definitions of intensity vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this document. Intensity definitions are provided throughout the analysis for negligible, minor, moderate, and major impacts. In all cases, the impact thresholds are defined for adverse impacts. Beneficial impacts are addressed qualitatively.

## *Cumulative Effects Analysis Method*

The CEQ regulations for implementing the NEPA require an assessment of cumulative effects in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7). These actions were identified, and cumulative impacts were determined, by combining the impacts of alternatives with those of the other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects at Saguaro National Park and, if applicable, the surrounding region. The geographic scope for this analysis includes elements mostly within the park's boundaries, while the temporal scope includes projects within a range of approximately 75 years. Given this, the following projects were identified for the purpose of conducting the cumulative effects analysis, listed from past to future.

## *Cumulative Impact Scenario*

### Past Actions within and around Saguaro National Park

#### Effects of Grazing

When Saguaro National Monument was created in 1933, about 80% of the monument was former U.S. Forest Service (USFS) land, and the park inherited six grazing allotments with this land. When a number of multiyear grazing permits on the monument were set to expire in 1935, both agencies decided to allow the USFS to continue to issue grazing permits. From this time until the mid-1970s, when grazing was finally phased out in the monument, a number of stocking strategies were tried on different allotments. However, for the most part, the combination of grazing and intermittent droughts caused the range to remain overgrazed.

Grazing wrought great changes on the landscape. The removal of vegetation cover led to increased movement of water across landscapes, and increased soil erosion, headwater cutting, and stream channelization; spring and seep fed marshes (cienegas) were destroyed, and sections of major rivers in the region ceased perennial flow; in grasslands, woody shrubs and nonnative weeds began to increase (Bahre 1995).

Grazing brought other indirect changes as well. Since 1860, nonnative plants have been introduced into the region in order to restore degraded rangeland and to control erosion (Bahre 1995). Overgrazing has been blamed for the alteration of natural conditions in the region, and specifically within the park. Southern Arizona's once sprawling grasslands have been overtaken by brush species. Overgrazing removed grass cover, which probably also reduced the frequency of wildfires that regularly swept the grasslands and favored less fire-tolerant brush species over grasses. (Clemensen 1987; Bahre 1995). Within Saguaro National Park, once-spectacular stands of saguaro cactus experienced visible declines. Cattle grazing in deserts undoubtedly trampled saguaro seedlings, keeping recruitment of this cactus low in the monument (Clemensen 1987)

#### Effects of Woodcutting

Woodcutting mesquite used for lime kilns in the Tucson basin and into the foothills removed larger nurse plants under which saguaro seedlings develop (Clemensen 1987). With the cessation of grazing and woodcutting in the park, researchers have seen a rebound in saguaro seedling recruitment (Turner 1992).

#### Effects of Postwar Development

The postwar population boom in the west has been seen especially in Arizona. Extensive urban and rural development has occurred throughout the state and in the region on private lands. Despite economic downturns in agriculture and mining industries in the region since the 1930s, regional population growth has been steady and continuous (Bahre 1995). In the 15 years from 1980 to 1995, Arizona's population almost doubled, from around 2.7 million people, to 4.2 million. During the same period, Tucson's population grew from 330,000 to around 450,000 (Tucson Metropolitan Chamber of Commerce 1997). Population projections show that the city of Tucson is expected to grow from a population of 486,699 in 2000 to 595,807 in 2010, assuming the city continues to annex land. The greater Tucson metropolitan area has a population of approximately 885,000 and is projected to be at 1,000,000 by the year 2009 (Tucson Planning Department 2001). Development of large housing tracts and businesses, associated infrastructure (roads, highways, drainage ways), and other land disturbance (abandoned farmland and overgrazed land) have lead to insularization, with park lands becoming islands in a human-manipulated environment (Shaw et al. 1992). These and associated concomitant effects of this development (introduction of exotic flora and fauna, an increase in human-caused fire) have all wrought changes on the natural systems in the region.

## Effects of Fire

Fire played a dominant role in pre-settlement forests of Arizona. During this time, forest ecology was shaped by——and ecosystem health depended on—fire. Pre-settlement fires in many ecosystems frequently spread over large areas in the abundant grass. As settlement began, large numbers of grazing livestock utilized much of each year's grass production, leaving little fuel to carry fire. As early settlers built homes and began working in forest environments, they found fire to be a threat to their livelihood and homes. Thus, beginning around the turn of the 20th century, fire was suppressed.

Within Saguaro National Park, fire has largely been suppressed since the 1920s. In areas of decades-long fire suppression, fuel has accumulated and forest density has increased to dangerous levels. Because the NPS suppressed wildland fires for decades, natural plant community succession, species composition, and structure have been altered. These changes are most pronounced in the desert grassland, woodland and forest, and ponderosa pine / mixed-conifer forest communities. In forest communities, the forest canopy has become increasingly closed, and forest openings have become smaller as shade-tolerant species grow in dense thickets while fewer grasses, forbs, and shrubs are growing in the remaining openings. Grasslands have been lost as small trees and shrubs encroach on meadows that once would have been maintained by frequent fires. In addition, subtle but important hydrological changes may have occurred because of increased forest growth. Decreased runoff and infiltration may have altered the water table around meadows, helping to accelerate tree invasion. All of these changes have, in turn, caused deterioration in the habitat favored by many forms of wildlife (NPS 2004a).

In the last two decades, the NPS restored fire to many of these areas by allowing naturally ignited fires that met management objectives to burn and by using prescribed fire and nonfire treatments. However, the present program has not been able to meet the needs of the whole park. Over the past 30 years, lightning has started an average of 9 fires a year in Saguaro National Park. In some years, thousands of acres burned while in other years only a few acres burned. These fires affected the amount and types of vegetation in those areas—both of which influence fire incidence and behavior (NPS 2004a).

Today, after more than 20 years of proactive fire management in Saguaro National Park, the goal of restoring natural fire regimes to the entire park landscape is far from being achieved although significant inroads have been made. In addition, the 2001 *Federal Fire Policy* specifically mandates public land agencies to reduce the amount of forest and shrubland fuels around areas with homes and buildings and to restore ecosystems to a more natural, fire-tolerant balance. In order to avert catastrophic fires, this means reducing fuels and changing plant community structure near buildings and in wildland areas. At the same time, the NPS has issued new fire management guidelines and has updated fire management plans, described in more detail below.

## Past Plans Within and Around Saguaro National Park

**Houghton Area Master Plan**. This plan encompasses approximately 10,800 acres southwest of Saguaro National Park's Rincon Mountain District (RMD) along Houghton Road. Seventy-six percent of the land covered by the plan is 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.

**General Management Plan—2008.** The *General Management Plan* (GMP) establishes the park's management direction for the next 15 to 20 years. Tiering off the foundation and direction established in the GMP, implementation plans (such as this trails plan) provide more site-specific direction and detailed actions needed to achieve resource conditions and visitor experiences described in the GMP.

**Javelina Picnic Area Environmental Assessment—2006.** This plan included constructing an education ramada, providing ADA access to the education ramada, reconstructing the Picnic Shelter Loop Trail,

constructing a new trail to a scenic overlook, connecting the Freeman Homestead Trail with the education ramada, and improving trash collection. By improving the Javelina Picnic Area, the NPS is in the process of enhancing the visitor experience with ADA access, reduced resource impacts, and improved educational and interpretive opportunities at this site.

**Cactus Forest Drive Environmental Assessment—2004**. 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. Under this plan, the following actions were implemented: repavement of the existing roadway along Route 500 and 100; reconfiguration of turnouts and the Javelina Picnic Area; improvement of road shoulders; establishment of bicycle lanes on Route 500; improvement of roadside drainage; replacement of two concrete box culverts; and improvement of drainage around stone walls constructed by the Civilian Conservation Corps (CCC).

**Exotic Plant Management Plan—2004.** Saguaro National Park prepared an exotic plant management plan to identify and analyze alternatives for managing and controlling exotic plant species within the park. Under the *Exotic Plant Management Plan*, 17 of the 80 exotic plant species found within the park were immediately treated because they were invasive, aggressive, and displaced native vegetation. The plan is also ongoing; the remaining species may be treated in future years.

**Fire Management Plan—2004.** The *Fire Management Plan* (FMP) considered the use of treatments to restore areas that have suffered the worst from vegetation encroachment, increasing forest density, and over protection. By focusing on the desired target forest conditions, the plan identifies activities for restoring these conditions and reducing the threats from unwanted wildland fires. Under the FMP, trails within the park would provide access for monitoring and control of wildland fires. Trails would also be used as boundaries for prescribed burns, anchor points for constructing fire lines, and as fire lines. Some potential impacts that could result from implementation of the FMP include possible damage to trails, structures, and signs; possible closures of trails, roads, and campsites; and the possible creation of new access to areas of the park caused by the removal of vegetation, which could result in the development of social trails.

**Pima County Comprehensive Plan—2001.** This plan updated 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*.

**Eastern Pima County Trail System Master Plan—1989.** This plan provided direction to Pima County in the development of a regional trail system throughout the area and incorporated trails that connect to Saguaro National Park.

**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.

## Current Actions, Projects and Plans Within and Around Saguaro National Park

- A boundary fence located along the perimeter of the Tucson Mountain District (TMD) was erected in 2008. The fence prevents grazing and off-road vehicle use, and it generally indicates the park boundary.
- A boundary fence located along the perimeter of the RMD was erected for the same reasons.

- Both districts are in the flight path for commercial aircraft from Tucson International Airport. This airport may expand a runway in order to accommodate larger planes. The RMD experiences fly-over from Davis-Monthan Air Force Base, and the Army National Guard occasionally flies over TMD. Small planes from the small public airport, Ryan Airfield, often fly over TMD.
- Historic structures close to trails have experienced and are still experiencing varying degrees of looting.

**Encroaching Development** – 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, near Tucson, has more than quintupled (570.8%) (Tucson Planning Department 2001) This increased development has resulted in a loss of horseback riding opportunities (gated communities often block horse access). Increased development can cause habitat fragmentation.

**Increased traffic** – Picture Rocks Road, Sandaria Road, Freeman Road, Broadway Boulevard, and Speedway Boulevard are experiencing increased traffic. Picture Rocks Road in the TMD is routinely utilized as a commuter road, and traffic is steadily increasing. Plans are being developed to build a bypass route for I-10, which may be built through Avra Valley, adjacent to the west side of TMD.

### Arizona-Sonora Desert Museum

The Arizona-Sonora Desert Museum is a world-renowned zoo, natural history museum, and botanical garden and is located very near the southern boundary of the TMD. Exhibits re-create the natural landscape of the Sonoran Desert Region with more than 300 animal species and 1,200 kinds of plants. The museum provides almost 2 miles of paths traversing the 21 acres as well as gift shops and eating facilities.

### Tucson Mountain Park

Tucson Mountain Park consists of 22,000 acres managed by Pima County. The park borders the southern boundary of Saguaro's TMD. The park includes the Arizona-Sonora Desert Museum and Old Tucson. Estimates put the number of annual visitors to the park at 1.5 million. 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. (M. Brosseau, Supervisor of Tucson Mountain Park, Visitor Use and Experience, pers. comm. 2003). Other facilities include three picnic areas with limited amenities.

### Ironwood Forest National Monument

Ironwood Forest National Monument is about 130,000 acres managed by the Bureau of Land Management (BLM). The monument is close to the west side of Saguaro's TMD. 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. The monument provides opportunities for wildlife viewing, scenic driving, hunting, hiking, bicycling, horseback riding, and camping. There are no visitor services in the monument at this time. The *Ironwood Forest National Monument Resource Management Plan* guides management of public lands within the Ironwood Forest National Monument.

### 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 RMD on the north, east, and south sides. The national forest provides 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. 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.

### Colossal Cave Mountain Park

The Colossal Cave Mountain Park is near the southern boundary of the RMD. 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 TMD. 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 USFS.

## Foreseeable Future Actions and Plans

Minor trail reroutes in both districts will be covered under a programmatic categorical exclusion and do not need to be addressed in an EA.

**Tucson Mountains Subregional Plan**. As part of the City of Tucson's *General Plan*, this subregional plan establishes future land use and development policies for the area on the east, south, and west sides of Saguaro National Park's TMD that 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.

**Rincon/Southeast Subregional Plan**. As part of the City of Tucson's *General Plan*, this subregional plan establishes future land use and development policies for the area on the south side of Saguaro National Park's RMD that have the potential for future annexation to Tucson. This plan covers about 400 square miles, which is mostly rural and sparsely populated although 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 are resource transition areas.

**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 the scenic Bajada Loop Drive and Golden Gate Road.

**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. The Cienegas Corridor is 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 white-tailed deer. The corridor is in a major watershed formed by the Rincon, Whetstone, Santa Rita, and Empire Mountain ranges. The watershed also provides Tucson with up to 20% of its groundwater recharge system. The Cienega Creek Natural Preserve is managed by Pima County Natural Resources,

Parks, and Recreation and is near the southern boundary of the RMD. The preserve is an exceptional area for wildlife viewing opportunities.

### Rapid Urbanization of the Greater Tucson Metropolitan Area

The greater Tucson metropolitan area had a population of approximately 885,000 during the 2000 census and is projected to be at 1,000,000 by the year 2009 (Tucson Planning Department, 2001). The metro area occupies the 30 miles that separate both districts of the park and has largely restricted natural open spaces to those near or surrounding both districts. Urban and suburban development could continue to bring a greater number of residents closer to park boundaries. These developments adjacent to the park could, in turn, put more stress on park resources, such as wildlife that migrates across park boundaries or vegetation communities that may be impacted by escaped ornamental plants. Nonnative animals could also escape or be released into the park. Problem species include bullfrogs, dogs, cats, goldfish, crayfish, and cattle. As the population of Tucson continues to grow and open spaces continue to diminish, the park is likely to experience more visitation and crowding in developed areas as well as on trails.

## *Impairment of National Park Resources*

Chapter 1 describes the related federal acts and policies regarding the prohibition against impairing park resources and values in units of the national park system. According to NPS *Management Policies 2006*, an action constitutes an impairment when an impact "would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values" (NPS 2006f). To determine impairment, the NPS must evaluate "the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts" (NPS 2006f).

National park system units vary based on their enabling legislation, natural and cultural resources present, and park missions; likewise, the activities appropriate for each unit and for areas in each unit also vary. For example, an action appropriate in one unit could impair resources in another unit. Thus, this document analyzes the context, duration, and intensity of impacts of the alternatives, as well as the potential for resource impairment, as required by *Director's Order 12* (NPS 2001). As stated in NPS *Management Policies 2006*, an impact on any park resource or value may constitute an impairment, but an impact would be more likely to constitute an 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
- key to the natural or cultural integrity of the park
- identified as a goal in the park's general management plan or other relevant NPS planning documents

The impact analysis includes findings of impairment of park resources for each of the management alternatives. Impairment findings are made for park resources affected by the alternatives. Wilderness values, visitor use and experience, and park management and operations are not considered park resources; therefore, impairment findings are not included as part of the impact analysis for these topics.

## *Unacceptable Impacts*

The impact threshold at which impairment occurs is not always readily apparent. Therefore, the NPS applies a standard that offers greater assurance that impairment will not occur by avoiding unacceptable impacts. These are impacts that fall short of impairment, but are still not acceptable within a particular park's environment. Park managers must not allow uses that would cause unacceptable impacts; they must

evaluate existing or proposed uses and determine whether the associated impacts on park resources and values are acceptable.

Virtually every form of human activity that takes place within a park has some degree of effect on park resources or values, but that does not mean the impact is unacceptable or that a particular use must be disallowed. Therefore, for the purposes of these policies, unacceptable impacts are impacts that, individually or cumulatively, would:

- be inconsistent with a park's purposes or values, or
- impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the park's planning process, or
- create an unsafe or unhealthful environment for visitors or employees, or
- diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values, or
- unreasonably interfere with:
- park programs or activities, or
- an appropriate use, or
- the atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the park, or
- NPS concessioner or contractor operations or services (NPS 2006).

In accordance with NPS *Management Policies*, park managers must not allow uses that would cause unacceptable impacts on park resources. To determine if unacceptable impacts on the resources and values of Saguaro National Park could occur, the impacts of proposed actions in this EA were evaluated based on the above criteria. A determination on unacceptable impacts is made in the “Conclusion” section for each of the physical resource topics carried forward in this chapter.

## *Vegetation*

### Methodology

This impact analysis was based on the existing assessment of vegetation types by district as well as on biotic community maps provided by the Intermountain Geographic Resource Information Management of the NPS (2008) and the proposed trails plan for both Saguaro National Park TMD and RMD.

The impact analysis was also 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.

### Intensity Thresholds

Within this analysis, impacts on vegetation in the park were assessed based on the type of action proposed. Impacts were compared to the available scientific literature and general ecology. Proposed actions were rated using two sets of criteria: type and intensity.

***Type*** determination included the following criteria:

- Effect (beneficial, adverse, or no discernable effect),
- Context (site-specific, local, or regional),
- Duration (short-term, lasting less than one year; or long-term, lasting more than one year).

***Intensity*** thresholds of an impact on vegetation range from negligible to major and can be positive or negative. These thresholds are briefly described below.

*Negligible:* The action might result in a change in vegetation, 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.

## No Action Alternative

### Rincon Mountain District

Under the no action alternative, the current condition of trails in the RMD would remain the same. As described in chapter 3, vegetation in the RMD consists of 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. Riparian forest and riparian woodland occur locally in canyon bottoms. Wet and dry meadows are found in scattered clearings at high elevations.

#### *Manning Camp Planning Area*

There would be no change to trails in the Manning Camp Planning Area. No new trails would be constructed, and trail maintenance activities would continue as under current conditions. Use of Manning Cabin would be reduced, and wilderness values in this area would be improved.

In the Manning Camp Planning Area, adverse effects on vegetation would decrease with the decreased use of the camp and the access trail. Trail crews would continue to maintain trails by stabilizing soils and planting native species in key locations, as a result, an overall increase in the area's vegetation would be expected. Effects on vegetation would be beneficial, local, short- and long-term, and minor.

#### *Southern Boundary Planning Area*

As in the Manning Camp Planning Area, no new trails would be built. In addition, newer expansion lands in the southern section of the district would not be evaluated for trail opportunities. Social trails may continue to develop within the southern expansion lands resulting in slight loss of vegetation and fragmentation of the local plant communities. Effects on vegetation would be adverse, short- and long-term, site-specific, and negligible.

#### *Cactus Forest Planning Area*

Redundant and maintenance-dependent trails in the Cactus Forest Planning Area would remain. Vegetation would continue to be lost as a result of ongoing trail use. Hikers and equestrians may move

aside or yield to another trail user, inadvertently trampling vegetation and/or loosening the soil. Trail widening resulting in local soil erosion and vegetation loss would continue to be detectible. Vegetation may also be indirectly impacted by soil erosion. As more soils are disturbed within and outside of the trail prism, erosion from storm events may harm smaller shrubs and trees by removing stabilizing soils and exposing roots. Trail crews would continue to maintain the trail by stabilizing soils and planting native species in key locations. Exotic species such as buffelgrass and fountain grass seed could continue to be inadvertently transported in and spread along the trail by horses and hikers. Social trails that enter and exit washes cause erosion and degrade sensitive xeroriparian habitat and also facilitate the introduction of nonnative species as well as fragment biotic communities. Comprehensive guidance for trail design, mitigation, signage and standards would not be undertaken. Effects on vegetation in the Cactus Forest Planning Area under the no action alternative would be adverse, local, short- and long-term, and minor to moderate.

In addition, the park has plans to improve the facilities at the existing Javelina Picnic Area, as defined under a separate planning process. Plans include constructing an education ramada, providing *Americans with Disabilities Act* (ADA) access to the education ramada, reconstructing the Picnic Shelter Loop Trail, constructing a new trail to a scenic overlook, connecting the Freeman Homestead Trail with the educational ramada, and improving trash collection. Effects on vegetation from the construction of this improvement, including ADA access which would be a hard surface trail, would be adverse, short- and long-term, local, and minor.

### *Foothills and Mountains Planning Area*

No new trails would be constructed, and trail maintenance activities would continue as under current conditions; therefore, effects would be beneficial, local, short- and long-term, and negligible.

### *Parking, Access Points, and Trailheads*

Formal parking for vehicles and horse vehicles/trailers would not be constructed at the Cactus Forest Forest Planning Area. Visitors would continue to park cars, trucks, and horse trailers along the sides of Speedway and Broadway boulevards to access the Wildhorse, Cactus Forest, and Douglas Springs trailheads. Hikers and equestrians would continue to unload, prepare for trail use, and cross along these roads, creating undesirable safety situations and trampling vegetation. Crowded trailheads would continue to experience widening as a result of trampled vegetation and soil erosion. Effects on vegetation would be adverse, short- and long-term, site-specific, and negligible.

### *Washes*

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, such as buffelgrass and fountain grass. Under the no action alternative, many of the washes in the RMD, which are located predominantly in the Cactus Forest Planning Area, would not be evaluated for their suitability for use as trails. However, vegetation would benefit because all washes in this district would be closed to trail use. When washes that are too narrow (and not suitable) are utilized as trails, sensitive vegetation, such as velvet mesquite, is adversely impacted due to physical disruption, trampling, and the inadvertent introduction of exotic species, such as fountain grass and seed (which can be transported in and spread along the wash through horses and hikers). Also under the no action alternative, social trails would continue to develop adjacent to wash banks, continuing to facilitate trampled vegetation, the introduction of nonnative species, and fragmentation of biotic communities. These impacts would have a local effect on the vegetative population. Continued impacts on vegetation under the no action alternative would be adverse, short- and long-term, local, and negligible to minor in intensity.

### *Cumulative Impacts*

The past, present, and reasonably foreseeable future actions with potential to affect vegetation are related primarily to cattle grazing and fire damage. The Saguaro National Monument was created in 1933, and approximately 80% of the monument was former USFS land which inherited six grazing allotments (Clemensen 1987). Grazing continued on park lands until the mid-1970s when grazing was phased out of the park lands. Grazing, combined with intermittent droughts, caused the park lands to become overgrazed. This resulted in accelerated sheet erosion and formation of gullies in some areas, caused by channelizing of water flow in livestock trails (similar to the effects observed as a result of horse use on recreational trails). Overgrazing has been blamed for the alteration of natural conditions in this region including the permanent loss of some surface soils, which are important for vegetation growth. Overgrazing has also removed grass cover, which has likely increased the frequency of fires in the area (Clemensen 1987, Bahre 1995).

Fire destroys vegetation and desert grasslands that stabilize soils. Over the past 20 years, the NPS has attempted to manage fire in the Saguaro National Park; however, the park is still far from achieving this goal. The NPS has adopted new fire management guidelines that could prove to be both beneficial and negative for vegetation.

In addition, several local area plans address future residential development, including new development near the park's boundaries, particularly the *Houghton Area Master Plan* and the *Rincon/Southeast Subregional Plan*. These plans are expected to bring development close to the park's southwestern and southern boundaries, respectively. This encroaching development has and would continue to reduce local populations of vegetation near the park's boundary and facilitate introduction of exotic vegetation within the park. As a result of encroaching development, the park has erected a boundary fence to help prevent illegal off-road use and associated damage to native vegetation.

The cumulative impacts on vegetation would be adverse, long-term, local, and moderate in the RMD. When combined with other past, present, and foreseeable future actions, the no action alternative would provide a small incremental increase in overall cumulative impacts.

### *Conclusion*

The no action alternative would continue to result in an overall degradation of vegetation in the park. Hiking, biking, and equestrian activity on trails would continue to erode soils and facilitate vegetation loss within the RMD. In the Manning Camp Planning Area, adverse effects on vegetation would decrease with the decreased use of the camp and the access trail. As a result, there would be an overall increase in vegetation in the area. Effects on vegetation would be beneficial, local, short- and long-term, and negligible to minor. Social trails would continue to develop within the Southern Boundary Planning Area, resulting in slight loss of vegetation and fragmentation of the local plant communities. Effects on vegetation would be adverse, short- and long-term, site-specific, and minor. Comprehensive guidance for trail design, mitigation, signs, and standards would not be undertaken. Effects on vegetation in the Cactus Forest Planning Area under the no action alternative would be adverse, local, short- and long-term, and minor to moderate as a result of continued erosion and trail degradation. In the Foothills and Mountains Planning Area, no new trails would be constructed, and trail maintenance activities would continue as under current conditions; therefore, effects would be beneficial, local, short- and long-term, and negligible. Visitors would continue to park cars, trucks, and horse trailers along the sides of Speedway and Broadway boulevards to access the Wildhorse, Cactus Forest, and Douglas Springs trailheads. Hikers and equestrians would continue to upload, prepare for trail use, and cross along these roads, creating undesirable safety situations and adverse impacts on vegetation. Impacts on vegetation via introduction of nonnative species introduced by horses and hikers would continue, as would fragmentation of biotic communities. Overall, the no action alternative impacts on vegetation in the RMD would be adverse, long-term, site-specific and local, and minor to moderate. The cumulative impacts on vegetation would be adverse, long-term, site-specific, and negligible to minor in the RMD. When combined with other past,

present, and foreseeable future actions, the no action alternative would provide a small increase in overall 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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

### Tucson Mountain District

As described in chapter 3, vegetation in the TMD consists of Sonoran 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 in the TMD because the highest point in the Tucson Mountains is 4,687 feet in elevation.

#### *Northeast Corner Planning Area*

Currently, no formal trails are located within the Northeast Corner Planning Area, but social trails, old roads, and eroding tracks abound. Under the no action alternative, there would be no formal trails designated in the area, and over time, disturbed areas would be restored to natural conditions. Effects on vegetation would be beneficial, local, long-term, and minor.

#### *Northwest Planning Area*

No official trails exist to the CCC area in the Northwest Planning Area although several social trails exist. Under the no action alternative, no new trails would be formalized or created to access the CCC area. No trail access would be provided to Panther or Safford Peaks. Official trails provide access to sections of this area; however, no new trails would be developed. With no formal trails leading to attraction sites, social trails would continue to develop and impact local populations of vegetation. Impacts on vegetation via introduction of nonnative species introduced by horses and hikers would continue, as would fragmentation of biotic communities. Overall, impacts would be adverse, site-specific, long-term, and minor.

#### *East Boundary Planning Area*

Few official trails exist in this area, and no new trails would be developed. Trail use would be limited to the Camino del Cerro trailhead, where trails lead to Wasson Peak or to a windmill that is currently a popular visitor destination. Under the no action alternative, no official trail access to other popular destinations or the proposed wilderness area in the lower section would be provided. Social trails would continue to develop, resulting in adverse, site-specific, long-term, and minor impacts.

#### *South Central Planning Area*

No new trail connections in the South Central Planning Area would be developed. Golden Gate Road would be closed to motor vehicle access and would be converted to a multiuse trail. To the west, trails and picnic areas would remain closed to horse use. The park would continue maintaining existing trails and structures. Effects on vegetation would be beneficial, local, short- and long-term, and negligible.

#### *Parking, Access Points, and Trailheads*

Under the no action alternative, existing access points and trailheads would remain. Any access points that are not officially designated as such would be closed. No new access points or trailheads would be assigned or constructed. Access points and trailheads would not be formalized, and trail use designations (i.e., multiuse, hiker only) would remain the same. Cars and horse trailers would continue to park along roads until the access points were closed. In the Northwest Planning Area, no trailheads exist that are

suitable for horse trailers, and none would be developed. Hikers and equestrians would continue to upload, prepare for trail use, and travel off-trail, trampling vegetation. Crowded trailheads would continue to experience widening as a result of trampled vegetation and soil erosion. Effects on vegetation would be adverse, short- and long-term, site-specific, and negligible.

#### *Washes*

Some washes in the TMD have already been designated as trails; that would not change under the no action alternative. No other washes in this district would be evaluated for or officially designated as trails. The function of washes as important vegetation and wildlife corridors would not be assessed, and social trails would continue to develop adjacent to wash banks. Associated impacts would be as described under the no action alternative for RMD: adverse, short- and long-term, local, and negligible to minor intensity.

#### *Cumulative Impacts*

Cumulative impacts in the TMD would be the same as those described under the no action alternative for RMD. When combined with other past, present, and foreseeable future actions, no action alternative impacts in the TMD on vegetation would be adverse, long-term, local, and moderate. The no action alternative would provide a small incremental increase in overall cumulative impacts.

#### *Conclusion*

Under the no action alternative, there would be no formal trails constructed in the Northeast Corner Planning Area. Because there are no current trails in this area, effects on vegetation would be beneficial, local, long-term, and minor. Vegetation in both the Northwest Planning Area and the East Boundary Planning Area would continue to be adversely impacted by the development of social trails, resulting in adverse, site-specific, long-term, and minor impacts. In the South Central Planning Area, the conversion of Golden Gate Road to a multiuse trail would reduce off-trail travel and result in beneficial local short- and long-term negligible impacts. The cumulative impacts on vegetation would be adverse, long-term, local, and moderate in the TMD. When combined with other past, present, and foreseeable future actions, the no action alternative would provide a small incremental increase in overall 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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Rincon Mountain District

### Alternative A Analysis

The RMD contains four distinct planning areas: Manning Camp, Southern Boundary, Cactus Forest, and Foothills and Mountains. Alternative A would impact vegetation in each of the planning areas as follows:

#### *Manning Camp Planning Area*

Actions under alternative A taken in the Manning Camp Planning Area would be the same as under the no action alternative with the exception that the Bonita Trail would be removed and restored to natural conditions. Therefore, the same impacts on vegetation that currently exist would continue to exist regarding utilization of the Primitive-zoned class C trails located within the Manning Camp Planning Area. Effects on vegetation would be beneficial, local, short- and long-term, and minor.

The removal and restoration of Bonita Trail to former natural conditions would increase the amount of contiguous biotic community classified as Petran Montane Conifer Forest and reduce the factors of

human disturbance, soil erosion, and introduction of nonnative species. Impacts on vegetation would be beneficial, long-term, site-specific, and negligible.

### *Southern Boundary Planning Area*

Under alternative A, the Hope Camp Trail would be converted to a multiuse trail to allow bicycle, horse and hiker use, and the eastern portion of the trail would be extended to the southern boundary of the park and would include a new access point at the boundary. The North Hope Camp Trail would be removed and restored to natural conditions.

If not widened, the trail conversions in the Southern Boundary Planning Area would be negligible because the trail is zoned Natural and is located near an existing trailhead. If widened, the conversion would have a direct adverse impact on vegetation. The new access point at the southern boundary would also likely increase human pressure due to accessibility; therefore, impacts on vegetation may be adverse, long-term, site-specific, and negligible to minor. The eastern portion of the trail that would be extended to the southern boundary of the park would not cause adverse impacts because it would replace a portion of the North Hope Camp Trail that already exists. A portion of the North Hope Camp Trail would be removed and restored to natural conditions. This would reduce human disturbance, soil erosion, and introduction of nonnative species. The removal and restoration of the North Hope Camp Trail would increase the amount of contiguous biotic community classified as the Arizona Upland Subdivision of the Sonoran Desertscrub. Impacts on vegetation would be beneficial, long-term, site-specific, and minor.

### *Arizona Trail*

The Arizona Trail would connect to the Hope Camp Trail and continue approximately 4.2 miles northeast to a connection with the Manning Camp Trail. This connection trail would bisect a previously contiguous biotic community classified as Semidesert Grassland. The impact on vegetation as a result of this trail and the consequent vegetation removal and introduction of human disturbance, soil erosion, and nonnative species, would be negligible to minor. Impacts on vegetation under alternative A would be adverse, long-term, site-specific, and negligible to minor.

### *Cactus Forest Planning Area*

Within the Cactus Forest Planning Area, five trails would be added, nine trails would be closed and restored, and one trail would be rerouted. A majority of the removal and addition of trails in the Cactus Forest trail system would take place in the Arizona Upland Subdivision of the Sonoran Desertscrub and Semidesert Grassland biotic communities.

The removal and restoration of nine trails to natural conditions would increase vegetation acreage and reduce human disturbance, soil erosion, and introduction of nonnative species. These actions would also increase contiguous biotic community. Construction of five new trails would decrease vegetation in the area and increase the amount of human traffic due to accessibility. The construction of more formal trails could encourage more social trails in the area, for access to new areas invites exploration of the surroundings. Overall, impacts on vegetation in the Cactus Forest Planning Area under alternative A would be adverse, short- and long-term, local, and minor.

### *Foothills and Mountains Planning Area*

Under alternative A, no new trails would be constructed, and trail maintenance activities would continue as under the no action alternative; therefore, effects would be beneficial, local, short- and long-term, and negligible.

### *Parking, Access Points, and Trailheads*

Under alternative A, two new access points would be created, and two would be relocated. Two trails would also be relocated to meet the relocated access at Wentworth Road.

Direct impacts on vegetation would include loss. Indirect impacts would include the increase of human pressure due to accessibility. Effects on vegetation would be adverse, long-term, site-specific, and minor.

New parking lots under alternative A would consist of paved parking for cars, gravel for horse trailers, a vault toilet, a shade ramada, concrete curbing and sidewalks, and other amenities, such as signs and trash receptacles, at the following locations:

- Speedway at the Douglas Springs/Wildhorse trailhead (Vehicle and Horse)
- Broadway Boulevard: two parking lots at the Cactus Forest trailhead (hiker) and the end of the road (equestrian)
- Camino Loma Alta at the Loma Alta trailhead

All parking areas would be in Upland Sonoran Desert areas. The proposed Speedway/Douglas Spring parking area is in a dry wash area which is a more sensitive habitat for vegetation. There are numerous saguaro cacti and palo verde trees in these areas. Some transplantation could occur; however, mature trees and saguaros with arms are usually too large to transplant successfully and would not survive. The loss of these saguaros would be a small percentage compared to the whole population of the park. Impacts associated with the construction of parking lots would be adverse, long-term, site-specific, and minor.

### *Washes*

Under alternative A, the Loma Verde, Monument, and Deer Valley washes would be designated as trails. Wash banks are sensitive riparian vegetation habitats. When washes get too narrow, there is a greater chance of disturbing localized portions of the banks. Usually wash beds are sparsely vegetated, so their designation as trails would have negligible direct impacts on vegetation. However, wash banks are routinely crossed. Allowing horses would increase the damage to banks and introduce nonnative species to wash trails. This may create a dispersal mechanism during precipitation events which could have indirect impacts on other vegetative communities downstream. Impacts on vegetation would be adverse, long-term, local, and minor.

### *Cumulative Impacts*

Under alternative A, cumulative impacts would be the same as those described under the no action alternative. When combined with other past, present, and foreseeable future actions, alternative A cumulative impacts on vegetation would be adverse, long-term, local, and moderate in the RMD. Actions under alternative A would provide a small incremental increase in overall cumulative impacts.

### *Conclusion*

The Comprehensive Trails Plan alternative A, proposed for Saguaro National Park, in its entirety decreases the number of trails within the northwest portion of the RMD and increases the number of trails within the southern portion of the RMD. These changes would occur within areas that currently have high densities of trails and human disturbances. Impacts on vegetation would be negligible to minor. The new Arizona Trail and access points would have an adverse long-term site-specific minor impact on vegetation. A majority of the trail construction that would occur under alternative A is within the sensitive Arizona Upland Subdivision of the Sonoran Desertscrub biotic community. Impacts would be adverse, long-term, site-specific, and negligible to minor because the proposed additions and removals of trails and access points would occur in local areas that currently have high densities of trails. Therefore, detectible changes to the local vegetation population would be slight. When combined with other past, present, and foreseeable future actions, alternative A cumulative impacts on vegetation would be adverse, long-term, local, and moderate. Actions under alternative A would provide a small incremental increase in overall 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 or proclamation of Saguaro National

Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

### Alternative B Analysis

Manning Camp Planning Area

There would be no change under alternative B compared to the no action alternative. Impacts would be beneficial, long-term, site-specific, and negligible to minor.

Southern Boundary Planning Area

Under alternative B, two trails and one new access point would be created. Unlike alternative A, bicycles would not be allowed on the Hope Camp Trail, and the North Hope Camp Trail would not be removed and restored to natural conditions. The two new trails would have minor impacts on vegetation and would be concentrated within Arizona Upland Subdivision of the Sonoran Desertscrub and Semidesert Grassland biotic communities. These trails would bisect currently contiguous biotic communities and would have detectible impacts on vegetation because of vegetation removal, soil loss, and introduction of nonnative species by hikers and horses. Additionally, the new access point would increase the amount of human traffic. Impacts on vegetation would be adverse, long-term, site-specific, and negligible to minor.

Arizona Trail

Under alternative B, the Arizona Trail would enter the park on its western boundary to connect to the Tanque Verde Ridge Trail, which is in the Foothills and Mountains Planning Area.

#### *Cactus Forest Planning Area*

Under alternative B, a hiker only trail would loop around Javelina Rocks and Javelina Wash, and two of its tributaries would be designated as official trails. Fewer trails (6) would be removed and restored to natural conditions under alternative B compared to alternative A. Impacts of doing so would be similar to alternative A, but to a lesser extent because fewer trails would be restored. The Ernie's Falls Trail and access would be developed as under alternative A.

A majority of the removal and addition of trails in the Cactus Forest trail system would take place in the Arizona Upland Subdivision of the Sonoran Desertscrub and Semidesert Grassland biotic communities. Due to the already high density of trails in the area, the construction of new trails would cause barely noticeable, or negligible impacts on vegetation. The removal and restoration of redundant trails to natural conditions would reduce the factors of human disturbance, soil erosion, and introduction of nonnative species. It would also reduce biotic fragmentation.

Indirect impacts on vegetation would result from increased accessibility and the resultant increase of human traffic, but these impacts would be barely detectable. Under alternative B, the Carillo and Garwood trails' designation as hiker only would decrease disturbance associated with horse travel, such as vegetation trampling. Impacts on vegetation would be beneficial, long-term, site-specific, and negligible.

#### *Foothills and Mountains Planning Area*

No new trails would be constructed, and trail maintenance activities would continue as under current conditions; therefore, effects would be beneficial, local, short- and long-term, and negligible.

The Arizona Trail would follow the alignment of the existing Tanque Verde Ridge Trail, originating at the Tanque Verde Ridge trailhead at the Javelina Picnic Area. Horses would be prohibited. As the trail would follow an existing trail alignment and existing trailhead, there would be no additional impact on vegetation.

### *Parking, Access Points, and Trailheads*

Impacts associated with parking, access points, and trailheads would be the same under alternative B as described in alternative A: adverse, long-term, site-specific, and minor.

### *Washes*

Impacts associated with washes would be the same under alternative B as described in alternative A: adverse, long-term, local, and minor.

### *Cumulative Impacts*

Cumulative impacts would be the same as those described under the no action alternative. When combined with other past, present, and foreseeable future actions, alternative B cumulative impacts on vegetation would be adverse, long-term, local, and moderate in the RMD. Actions under alternative B would provide a small incremental increase in overall cumulative impacts.

### *Conclusion*

Under alternative B, five trails would be closed, five trails would be created, and three washes would be converted to trails. Three parking lots, five access points, and one trailhead would be added. Three trails segments would be converted to hiker only. These changes would occur primarily within areas that currently have high densities of trails and human disturbances. In the Southern Boundary Planning Area, new trails and access points would increase human traffic. Impacts on vegetation would be adverse, long-term, site-specific, and negligible to minor. The Cactus Forest Planning Area overall impacts would be beneficial, long-term, site-specific, and negligible due to the restoration of redundant trails. No new trails would be constructed, and trail maintenance activities would continue as under current conditions in the Manning Camp Planning Area and the Foothills and Mountains Planning Area; therefore, effects would be beneficial, local, short- and long-term, and negligible. Cumulative impacts under alternative B would be adverse, long-term, local, and moderate in the RMD. When combined with other past, present, and foreseeable future actions, alternative B would provide a small incremental increase in overall 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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Alternative C Analysis

Manning Camp Planning Area

There would be no change under alternative C compared to alternative A. Impacts would be beneficial, long-term, site-specific, and negligible to minor.

Southern Boundary Planning Area

The trail configuration under alternative C would be the same as alternative B, except that bicycles would be allowed on Hope Camp Trail, and the North Hope Camp Trail would be removed and restored to natural conditions. Removal and restoration of the North Hope Camp Trail to natural conditions would be beneficial for vegetation; impacts would be long-term, site-specific, and negligible to minor. The alignment of the Arizona Trail under alternative C would be the same as described in alternative A; impacts would be adverse, long-term, site-specific, and minor.

### *Cactus Forest Planning Area*

Under alternative C, two trails would be created, one multiuse and one designated as horse and hiker. One trail would be rerouted. Seven trails would be closed and restored to natural conditions.

A majority of the removal and addition of trails in the Cactus Forest trail system would take place in the Arizona Upland Subdivision of the Sonoran Desertscrub and Semidesert Grassland biotic communities. Due to the already high density of trails in the area, the construction of new trails in the area would cause negligible impacts on vegetation. The removal and restoration of seven trails to natural conditions would reduce the factors of human disturbance, soil erosion, and introduction of nonnative species.

Indirect impacts on vegetation would occur from increased accessibility and the resultant increase in human traffic, but these impacts would be barely detectable. Impacts on vegetation would be adverse, short- and long-term, local, and negligible.

### Foothills and Mountains Planning Area

Under alternative C, there would be no change compared to the no action alternative. Impacts would be beneficial, local, short- and long-term, and negligible.

#### Parking, Access Points, and Trailheads

Impacts associated with parking, access points, and trailheads would be the same under alternative C as described in alternative A: adverse, long-term, site-specific, and minor.

### *Washes*

Under alternative C, five washes would be formalized as trails and would be open to hikers and equestrian use. Impacts associated with washes would be the same as described in alternative A: adverse, long-term, local, and minor.

### *Cumulative Impacts*

Cumulative impacts under alternative C would be the same as those described under the no action alternative. When combined with other past, present, and foreseeable future actions, alternative C cumulative impacts on vegetation would be adverse, long-term, local, and moderate in the RMD. Actions under alternative C would provide a small incremental increase in overall cumulative impacts.

### *Conclusion*

Many changes would occur within areas that currently have high densities of trails; therefore, impacts on vegetation would be negligible. New access points and trailhead would have adverse long-term site-specific negligible impacts on vegetation. A majority of the trail maintenance proposed would occur within the sensitive Arizona Upland Subdivision of the Sonoran Desertscrub biotic community.

Removal and restoration of the North Hope Camp Trail to natural conditions would be beneficial for vegetation; impacts on vegetation would be long-term, site-specific, and negligible to minor. The alignment of the Arizona Trail would be the same as described in alternative A, with adverse, long-term, site-specific, and minor impacts. There would be no change under alternative C compared to alternative A in the Manning Camp Planning Area and the Foothills and Mountains Planning Areas. Impacts for these areas would be beneficial, local, short- and long-term, and negligible. In the Cactus Forest Planning Area, indirect impacts on vegetation would include increased human traffic; impacts on vegetation would be adverse, short- and long-term, local, and negligible.

Cumulative impacts for vegetation under alternative C would be adverse, long-term, local, and moderate in the RMD. When combined with other past, present, and foreseeable future actions, alternative C would provide a small incremental increase in overall 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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

### Preferred Alternative

#### *Manning Camp Planning Area*

Under the preferred alternative, there would be no change compared to the no action alternative. Impacts would be beneficial, local, short- and long-term, and minor.

Southern Boundary Planning Area

Impacts would be the same under the preferred alternative as under alternative C. Removal and restoration of the North Hope Camp Trail to natural conditions would be beneficial for vegetation; impacts would be long-term, site-specific, and negligible to minor. The alignment of the Arizona Trail would be the same as described in alternative A; impacts would be adverse, long-term, site-specific, and minor.

#### *Cactus Forest Planning Area*

Similar to alternative B, under the preferred alternative, fewer trails (7) would be removed and restored to natural conditions compared to alternative A. Also as under alternative B, two existing trails would be converted to hiker only. A portion of the Mica View Trail would be converted to an ADA challenge trail. A majority of the removal and addition of trails in the Cactus Forest trail system would take place in the Arizona Upland Subdivision of the Sonoran Desertscrub and Semidesert Grassland biotic communities. Impacts under the preferred alternative would be the same as described under alternative B: beneficial, long-term, site-specific, and negligible.

#### *Foothills and Mountains Planning Area*

There would be no change under the preferred alternative compared to the no action alternative. Impacts would be beneficial, local, short- and long-term, and negligible.

#### *Parking, Access Points, and Trailheads*

Impacts associated with parking, access points, and trailheads under the preferred alternative would be the same as described in alternative A: adverse, long-term, site-specific, and minor.

*Washes*
Under the preferred alternative, five washes would be formalized as trails and would be open to hikers and equestrian use. Impacts associated with washes would be the same as described in alternative A: adverse, long-term, local, and minor.

#### *Cumulative Impacts*

Cumulative impacts under the preferred alternative would be the same as those described under the no action alternative. When combined with other past, present, and foreseeable future actions, the preferred alternative cumulative impacts on vegetation would be adverse, long-term, local, and moderate in the RMD. The preferred alternative would provide a small incremental increase in overall cumulative impacts.

#### *Conclusion*

Many changes would occur within areas that currently have high densities of trails; therefore, impacts on vegetation would be negligible. The majority of the trail maintenance would occur within the sensitive

Arizona Upland Subdivision of the Sonoran Desertscrub biotic community. New access points and trailheads would have adverse long-term site-specific negligible impacts on vegetation. There would be no change compared to the no action alternative in the Manning Camp Planning Area and the Foothills and Mountains planning areas. Impacts for these areas would be beneficial, local, short- and long-term, and negligible. In the Southern Boundary Planning Area, impacts would be the same as alternative C. Removal and restoration of the North Hope Camp Trail to natural conditions would be beneficial for vegetation; impacts would be long-term, site-specific, and negligible to minor. The alignment of the Arizona Trail would be the same as described in alternative A; impacts would be adverse, long-term, site-specific, and minor. Impacts in the Cactus Forest Planning Area would be the same as described under alternative B: beneficial, long-term, site-specific, and negligible. When combined with other past, present, and foreseeable future actions, the preferred alternative cumulative impacts on vegetation would be adverse, long-term, local, and moderate in the RMD. The preferred alternative would provide a small incremental increase in overall 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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Tucson Mountain District

### Alternative A Analysis

*Northeast Corner Planning Area*

Under alternative A, one trailhead and one access point would serve an interior loop trail. The remaining social trails would be restored and allowed to return to natural conditions. The trail crossing for the Ringtail Trail would be relocated. Indirectly, human traffic would increase due to increased accessibility. Overall, impacts on vegetation would be beneficial from the closure of social trails and would be long-term, local, and negligible.

*Northwest Planning Area*

Under alternative A, two new trails would be constructed, including an ADA compliant impervious surface trail near the CCC Camp Pima. The other trail would provide access to Panther and Safford Peaks. There would be a loss of habitat associated with the construction of new trails, and the addition of a concrete trail would provide convenient access to larger numbers of people. A formal trail to the two peaks would bisect a vegetative community in a relatively undisturbed part of the park. Restoration of social trails would benefit local vegetation populations. The implementation of alternative A in the Northwest Corner Planning Area would be beneficial due to the restoration of social trails and would be adverse due to loss resulting from new construction. Impacts would be long-term, local, and negligible to minor.

*South Central Planning Area*

Consistent with the GMP, under alternative A, Golden Gate Road would be converted to a multiuse (hiking, biking, and equestrian) trail.

A new trail would connect Picture Rocks Wash with Prophecy Wash. Just west of Apache Peak, Wild Dog Trail would be removed and restored to natural conditions, and the Bajada and Dobe Wash trails would connect on the eastern side of Apache Peak. In the southwest portion of the planning area, an ADA compliant trail would be added or "stacked" outside and around the existing Desert Discovery Nature trail, and an additional ADA trail would be offered at the Red Hills Visitor Center.

The addition and conversion of trails to multiuse would likely increase the human traffic due to increased accessibility, but implementation of design standards would mitigate impacts on vegetation. Restoration of Wild Dog Trail would result in slight changes to vegetation populations. Overall, impacts on vegetation under alternative A would be beneficial, long-term, site-specific, and negligible to minor.

The new trail connecting Picture Rocks Wash and Prophecy Wash would bisect a previously contiguous biotic community classified as Arizona Upland Subdivision of the Sonoran Desertscrub. Impacts associated with this trail would be a result of local vegetation removal, introduction of human disturbance, soil erosion, and introduction of nonnative species. Overall, impacts on vegetation would be adverse, long-term, site-specific, and minor.

### *East Boundary Planning Area*

Under alternative A, a network of social trails that are accessed by the Veteran's access point, the Pipeline, and Abbington Roads would be formalized. All other social trails and old roads would be restored and allowed to return to natural conditions.

The formalization of social trails to adhere to the principles of a comprehensive plan would improve overall impacts on vegetation. The restoration of all other social trails would benefit local vegetation. Impacts on vegetation would be beneficial, long-term, site-specific, and minor.

### *Parking, Access Points, and Trailheads*

Under alternative A, two new access points and two new trailheads would be constructed, and two of each would be formalized. Formalization of an existing access does not necessitate a significant habitat loss, but depending on the type of access, it could result in increased human pressure at the site. Effects on vegetation would be adverse, site-specific, long-term, and minor.

Parking lots in the TMD would include the following:

- parking at the north end of Golden Gate Trail at Picture Rocks Road
- parking at the south end of Golden Gate Trail at the Sendero-Esperanza trailhead (expand existing parking)
- the CCC Camp trailhead on Rudasill Road would be paved for cars (no horse trailer parking) with concrete curbing and sidewalks
- Belmont, at the north end of Belmont Trail, would be paved when the road is paved and would provide for cars; two horse trailer spaces would also be provided.

All parking areas are in Upland Sonoran Desert areas and would be located in popular, and therefore, already highly developed areas. There are numerous saguaro cacti and palo verde trees in these areas. The Trails Restoration Plan (appendix E) provides mitigation measures for new construction for vegetation. Some transplantation could occur; however, mature trees and saguaros with arms are usually too large to transplant successfully and would not survive. The loss of these saguaros would be a small percentage compared to the whole population of the park. Impacts associated with the construction of parking lots would be adverse, long-term, site-specific, and minor.

### *Washes*

Impacts on washes under alternative A in the TMD would be the same as described in the RMD. Impacts on vegetation would be adverse, long-term, local, and minor.

### *Cumulative Impacts*

Cumulative impacts under alternative A would be the same as those described under the no action alternative. When combined with other past, present, and foreseeable future actions, alternative A

cumulative impacts on vegetation would be adverse, long-term, local, and moderate in the TMD. Actions under alternative A would provide a small incremental increase in overall cumulative impacts.

### *Conclusion*

Alternative A for the TMD would occur within the Arizona Upland Subdivision of the Sonoran Desertscrub biotic community. The proposed additions and removals of trails and access points would occur in areas that currently have high trail density and human disturbances with the exception of the trail providing access to Panther and Safford Peaks. The restoration and/or formalization of social trails and access points would benefit vegetation by removing the factors of disturbance and/or formalizing trails to adhere to the principles of a comprehensive plan. In the Northeast Corner Planning Area, impacts on vegetation would be beneficial from the closure of social trails and would be long-term, local, and negligible. In the Northwest Planning Area, impacts would be beneficial due to the restoration of social trails and adverse due to loss from new construction. Impacts would be long-term, local, and negligible to minor. In the South Central Planning Area, impacts on vegetation associated with new trails would be adverse, long-term, site-specific, and minor. In the East Boundary Planning Area, the restoration of all other social trails would benefit local vegetation. Impacts on vegetation would be beneficial, long-term, site-specific, and minor. When combined with other past, present, and foreseeable future actions, actions under alternative A would provide a small incremental increase in overall 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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Alternative B Analysis

### *Northeast Corner Planning Area*

Under alternative B, changes would be similar to alternative A, but three loops (instead of one), and three access points would be created. Impacts would be the same as described under alternative A: beneficial from the closure of social trails and long-term, local, and negligible.

### *Northwest Planning Area*

Changes under alternative B would be similar to alternative A, but the ADA interpretive trail to the CCC camp would permit horses along the southern leg only. No horses would be allowed on the top part of the loop, which would access the new trailhead. However, an additional spur and access point to the west would provide horse parking and equestrian access to this area. A formal trail to two peaks would bisect a vegetative community in a relatively undisturbed part of the park. Restoration of social trails would benefit local vegetation populations. Actions under alternative B would be similar to alternative A; impacts would be beneficial due to the restoration of social trails, adverse due to loss from new construction, and long-term, local, and negligible to minor.

### *South Central Planning Area*

As in alternative A, under alternative B, connecting Picture Rocks Wash with Prophecy Wash would create a new loop opportunity. Wild Dog Trail would remain, and Bajada and Dobe Wash trails would not be connected — same as the no action alternative. A new hiker and equestrian trail would be constructed from the Red Hills Visitor Center to the southwestern corner of the park. The new trails would bisect previously contiguous biotic communities classified as Arizona Upland Subdivision of the Sonoran Desertscrub and would likely increase human disturbance. As described under alternative A, impacts on vegetation under alternative B would be local and detectable and would result from vegetation removal,

introduction of human disturbance, soil erosion, and introduction of nonnative species. Overall, impacts on vegetation would be adverse, long-term, site-specific, and minor.

### *East Boundary Planning Area*

Under alternative B, changes would be similar to alternative A, but additional trails and access points would be added. Bicycles would be allowed on the Belmont Trail. Overall, as described in alternative A, the restoration of all other social trails would benefit local vegetation. Impacts on vegetation would be beneficial, long-term, site-specific, and minor.

### *Parking, Access Points, and Trailheads*

Under alternative B, nine new access points, and three new trailheads would be provided in areas that currently have none (the Northeast and Eastern Planning Areas), or few (the Northwest Planning Area).

Impacts associated with parking, access points, and trailheads would be the same as described in alternative A: adverse, long-term, site-specific, and minor

### *Washes*

Under alternative B, one additional wash would be formalized as a trail and would be open to hikers and equestrian use. Impacts associated with washes would be the same as described in alternative A: adverse, long-term, local, and minor.

### *Cumulative Impacts*

Cumulative impacts under alternative B would be the same as those described under the no action alternative. When combined with other past, present, and foreseeable future actions, alternative B cumulative impacts on vegetation would be adverse, long-term, local, and moderate in the TMD. Alternative B would provide a small incremental increase in overall cumulative impacts.

### *Conclusion*

Alternative B for TMD would occur within the Arizona Upland Subdivision of the Sonoran Desertscrub biotic community. The restoration and/or formalization of social trails and access points would benefit vegetation by removing the factors of disturbance and/or formalizing trails to adhere to the principles of a comprehensive plan. In the Northeast Corner Planning Area, changes would be similar to alternative A, and the impacts would be the same as described under alternative A: beneficial from the closure of social trails, long-term, local, and negligible. In the Northwest Planning Area, actions under alternative B would be similar to alternative A; impacts would be beneficial due to the restoration of social trails, adverse due to loss from new construction, long-term, local, and negligible to minor. In the South Central Planning Area, impacts on vegetation would result from vegetation removal, introduction of human disturbance, soil erosion, and the introduction of nonnative species. Impacts would be adverse, long-term, site-specific, and minor. Changes would be similar to alternative A in the East Boundary Planning Area; impacts would be beneficial, long-term, site-specific, and minor. When combined with other past, present, and foreseeable future actions, alternative B cumulative impacts on vegetation would be adverse, long-term, local, and moderate in the TMD. Actions under alternative B would provide a small incremental increase in overall 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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park’s GMP or other relevant NPS planning documents, there would be no impairment of the park’s resources or values. There would also be no unacceptable impacts as defined in the “Unacceptable Impacts” section of this chapter.

### Preferred Alternative

*Northeast Corner Planning Area*

Under the preferred alternative, two loop trails with three spur trails that connect to access points would be formalized from existing social trails, and all other social trails would be restored. Changes would be similar to alternative B, but two loops would be retained instead of three. The trail proposed under alternative B that parallels the park boundary would not be included. As described under alternative B, impacts would be beneficial from the closure of social trails and would be long-term, local, and negligible.

*Northwest Planning Area*

Under the preferred alternative, changes would be the same as in alternative B, with the addition of converting the Cactus Wren and Manville Trails from hiker only to equestrian and hiker. Impacts on vegetation would be the same as described under alternative B: beneficial due to the restoration of social trails, adverse due to loss from new construction, long-term, local, and negligible to minor.

*South Central Planning Area*

As in alternative A, under the preferred alternative, Picture Rocks Wash would connect with Prophecy Wash, and Bajada Wash would connect with Dobe Wash. As in alternative B, a new trail would be constructed from the visitor center to the southwestern park boundary; a new ADA compliant trail would loop off of this trail. Also as in alternative B, Wild Dog Trail would remain. However, under the preferred alternative, it would be converted to hiker only. At Signal Hill, a new trail segment would be constructed to connect Cactus Wren and Manville trails; this segment would avoid the picnic area. Picnic area trails would remain hiker only, and a hitch rail at the horse trail would allow equestrians to walk into the picnic area. As described under alternatives A and B, under the preferred alternative, impacts on vegetation would be local and detectable and result from vegetation removal, introduction of human disturbance, soil erosion, and the introduction of nonnative species. Overall, impacts on vegetation would be adverse, long-term, site-specific, and minor.

*East Boundary Planning Area*

Under the preferred alternative, changes to the East Boundary would be similar to alternative B. Slight differences to the alternatives, such as bicycle use on the Belmont Trail, would not result in measurable differences in impacts on vegetation. Impacts on vegetation would be beneficial, long-term, site-specific, and minor.

*Parking, Access Points, and Trailheads*

The same number of access points and trailheads proposed under alternative B would be provided under the preferred alternative although they would be distributed slightly differently. Impacts associated with parking, access points, and trailheads would be adverse, long-term, site-specific, and minor.

*Washes*

Under the preferred alternative, an additional wash would be designated as a trail and would be open to hikers and horses. In addition, Picture Rocks Wash, located in the Northeast Corner Planning Area, would be converted to an official trail. Impacts associated with washes would be the same as described in alternative A: adverse, long-term, local, and minor.

*Cumulative Impacts*

Cumulative impacts under the preferred alternative would be the same as those described under the no action alternative. When combined with other past, present, and foreseeable future actions, the preferred alternative cumulative impacts on vegetation would be adverse, long-term, local, and moderate in the

TMD. Actions under the preferred alternative would provide a small incremental increase in overall cumulative impacts.

*Conclusion*

Actions under the preferred alternative for TMD would occur within the Arizona Upland Subdivision of the Sonoran Desertscrub biotic community. The restoration and/or formalization of social trails and access point would benefit vegetation by removing the factors of disturbance and/or formalizing trails to adhere to the principles of a comprehensive plan. In the Northeast Corner Planning Area, changes would be similar to alternative B: beneficial from the closure of social trails, long-term, local, and negligible. In the Northwest Planning Area, actions under the preferred alternative would be similar to alternative B: beneficial due to the restoration of social trails, adverse due to loss from new construction, long-term, local, and negligible to minor. In the South Central Planning Area, impacts on vegetation would be as described under alternatives A and B; impacts on vegetation would result from vegetation removal, introduction of human disturbance, soil erosion, and the introduction of nonnative species and would be local and detectable. Overall, impacts on vegetation would be adverse, long-term, site-specific, and minor.

Changes would be similar to alternative B in the East Boundary Planning Area: beneficial, long-term, site-specific, and minor. When combined with other past, present, and foreseeable future actions, the preferred alternative cumulative impacts on vegetation would be adverse, long-term, local, and moderate in the TMD. Actions under the preferred alternative would provide a small incremental increase in overall 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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## *Wildlife*

### Methodology

While there are numerous studies on the effect of roads on wildlife, studies on the effect of trails on wildlife are less well documented in the scientific literature. Some species may not be as affected by new trails and/or increased human pressure because they are generally more tolerant of such disturbance or are active at night. While smaller animals may suffer few or no adverse impacts from the creation of an additional trail, larger animals may tend to avoid the area; thus for those species, potential suitable habitat may decrease.

Effects on wildlife include both direct and indirect effects and can be considered in terms of whether they are temporary or permanent. Direct impacts on wildlife include the accidental or intentional mortality of an individual or population, injury, or stress from species flight. Direct contact with certain species may induce injury, leading to death of the animal. Poaching or hunting within a park may be illegal, but it still occurs.

### Intensity Thresholds

Within this analysis, impacts on wildlife in the park were assessed based on the type of action proposed and were compared to the available scientific literature, known animal behaviors, and general ecology. Proposed actions were rated using two sets of criteria: type and intensity.

***Type*** determination included the following criteria:

- Effect (beneficial, adverse, or no discernable effect),
- Context (site-specific, local, or regional),
- Duration (short-term, lasting less than one year; or long-term, lasting more than one year).

***Intensity*** thresholds of an impact on wildlife range from negligible to major and can be positive or negative. These thresholds are briefly described below.

> *Negligible*: The action might result in a change in 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.

## No Action Alternative

The no action alternative represents current conditions and is also a baseline for comparison of the action alternatives. Under this alternative, the park would continue to manage trails without a comprehensive plan for a balanced and sustainable trail system. No new trails would be designed and constructed, and trails in both units would not be evaluated for sustainable condition and suitability. Social trails would not be converted to official trails, and a majority of them would eventually be closed and restored.

### Rincon Mountain District

*Manning Camp Planning Area*

Under the no action alternative, the current condition of trails in the Manning Camp Planning Area would remain the same. Redundant and maintenance-dependent trails would remain and would continue to disturb high country wildlife habitats, such as that of the Mexican Spotted Owl (MSO). Comprehensive guidance for trail design, mitigation, signs and standards would not be undertaken. However, as stated in the GMP, use of the Manning Cabin would be reduced; therefore, associated human pressure would be reduced and wilderness values would be improved (NPS 2008). The adverse impacts associated with trail erosion and habitat fragmentation would be reduced by the beneficial impact of reduced visitor use. Overall, impacts would be beneficial, local, long-term, and negligible.

*Southern Boundary Planning Area*

The Southern Boundary Planning Area contains true riparian habitat that is home to many sensitive species, including neotropical migratory bird species and the lowland leopard frog. Visitor use in this area may increase as a result of the Arizona Trail, which would terminate outside the park near the southern boundary. Under the no action alternative, a new route within the park connecting to the Arizona Trail

would not be considered. If social trails are created in this area or if illegal camping occurs by visitors attempting to continue farther into the park, sensitive wildlfie may be disturbed. Other impacts on wildlife in the Southern Boundary Planning Area would be similar to those in the Manning Camp Planning Area. Newer expansion lands in the southern section of the district which provide habitat for desert tortoise would not be evaluated for new trail opportunities. Comprehensive guidance for trail design, mitigation, signs, and standards would not be undertaken. Trail widening, resulting in vegetation loss and soil erosion, would continue, resulting in slight degradation of the overall foraging habitat for resident wildlife species. Social trails would continue to impact washes which function as important wildlife and vegetation corridors. These trails would continue to fragment some habitats and facilitate the introduction of exotic plant species. Overall, impacts would be adverse, local, long-term, and negligible to minor.

### *Cactus Forest Planning Area*

The Cactus Forest Planning Area is one of the more popular and intensely used areas of the RMD, and it contains many washes. Social trails would continue to develop in and adjacent to washes, which contain sensitive vegetation/wildlife habitat and provide movement corridors for many wildlife species. Impacts, such as erosion, trail widening, and habitat fragmentation, would continue. Additionally, as part of the no action alternative, the park has plans to improve facilities at the Javelina Picnic Area, which includes construction of additional trails, educational facilities, and ADA compliant access. These improvements would have a detectible adverse impact on wildlife because of the destruction of habitat, the increase in impervious surface, and the increased potential for trash to accumulate in the area. Overall, impacts from the no action alternative in the Cactus Forest Planning Area would be adverse, long-term, local, and minor due to the location and current utilization of the area.

### *Foothills and Mountains Planning Area*

The impacts on wildlife in the Foothills and Mountains Planning Area would be similar to those in the Manning Camp Planning Area. Under the no action alternative, no trails would be restored, and no new trails would be constructed. The Douglas Spring Trail is one of the highest used trails in the park and this planning area; in addition the Douglas Spring Camping Area receives high numbers of visitors. Wildlife around the camping area could be adversely impacted by adjacent social trails and potential improper disposal of refuse. The rest of the Foothills and Mountains Planning Area receives very little trail use. Impacts on this area would be adverse, local, long-term, and negligible.

### *Parking, Access Points, and Trailheads*

Under the no action alternative, no construction of additional parking or trailheads would occur. Inadequate design, insufficient area available for parking, and reliance on informal parking would continue. Visitors would continue to trample vegetation and create social trails to trailheads and access points from parking areas, and as a result, wildlife habitat would continue to be fragmented and disturbed. Impacts on wildlife would be adverse, site-specific, short- and long-term, and negligible.

### *Cumulative Impacts*

The past, present, and reasonably foreseeable future actions with potential to affect wildlife are related primarily to encroaching development around the park. Several local area plans address future residential development, including new development near the park's boundaries, particularly the *Houghton Area Master Plan* and the *Rincon/Southeast Subregional Plan*. These plans are expected to bring development close to the park's southwestern and southern boundaries, respectively. As a result, wildlife may be forced to forage in developed areas or in areas where increased predation might occur. As a result of encroaching development, the park has erected a boundary fence to help prevent illegal off-road use. Encroaching development has, and would continue to, reduce wildlife habitat. Additionally, past grazing and fire events have contributed to soil erosion, vegetation loss, and the introduction of exotic plant species, all of which have degraded foraging habitats. The no action alternative would provide a slight incremental increase in the overall cumulative impacts. Impacts of the actions described above, particularly

development, would have an overall adverse regional long-term moderate impact on wildlife, for the reduced wildlife habitat surrounding the park is clearly detectible.

### *Conclusion*

Under the no action alternative, the adverse impacts associated with trail erosion and habitat fragmentation would continue. In the Manning Camp Planning Area, the adverse impacts would be reduced by the benefit of reduced visitor use. Overall, impacts in this area would be beneficial, local, long-term, and negligible. In the Foothills and Mountains Planning Area, impacts would also be adverse, local, long-term, and negligible. Social trails in the Southern Boundary Planning Area would continue to develop as people enter and exit washes that otherwise function as important wildlife and vegetation corridors. Use of these social trails would continue to result in the introduction of exotic plant species and degradation of xeroriparian habitats. Impacts in the Southern Boundary Planning Area would be adverse, local, long-term, and negligible to minor. In the Cactus Forest Planning Area, plans to improve the Javelina Picnic Area, combined with the continued adverse impacts associated with a dense trail system and vegetation loss due to soil erosion, would result in adverse long-term local minor impacts. Parking and trailhead areas would experience adverse site-specific short- and long-term negligible impacts due to vegetation trampling and human pressure.

The no action alternative would provide a slight incremental increase in the overall cumulative impacts. Overall, cumulative impacts on wildlife would be adverse, regional, long-term, and moderate.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Tucson Mountain District

### *Northeast Corner Planning Area*

Currently, no formal trails are located within the Northeast Corner Planning Area. Under the no action alternative, there would be no formal trails constructed in the area, and social trails would not be expected to proliferate. Effects on wildlife would be beneficial, local, long-term, and negligible.

### *Northwest Planning Area*

Under the no action alternative, no trails exist to Panther and Safford Peaks, and none would be developed. Lack of formal access to the peaks may increase the use of social trails to the area. Without comprehensive guidance for trail design and mitigation, sensitive mountaintop species, such as raptors, could be adversely impacted by human disturbance. Social trails leading to the CCC camp would eventually be closed; however, without formal trails leading to attraction sites, these trails would likely form again. These social trails present human disturbance to wildlife and reduce foraging habitat. A continued lack of trail routes to attraction sites would be an adverse site-specific long-term negligible impact on wildlife.

### *East Boundary Planning Area*

Few official trails exist in this area, and no new trails would be developed under the no action alternative. Trails to such attractions as old mines and a crested saguaro would not be developed, and social trails may continue to form despite closures which would result in slight adverse impacts on wildlife. A continued lack of trail routes to attraction sites would be an adverse site-specific long-term negligible impact on wildlife.

### *South Central Planning Area*

Under the no action alternative, no new trails would be developed in the South Central Planning Area. Golden Gate Road would be closed to motor vehicle access and would be converted to a multiuse trail, resulting in a beneficial impact on wildlife. Closing the road to vehicles would eliminate disturbance to wildlife from vehicle noise and also eliminate motor vehicle hazards such as “road kill.” For this reason, impacts on wildlife in this planning area would be beneficial, local, long-term, and minor.

### *Parking, Access Points, and Trailheads*

Under the no action alternative, no new trailheads or parking lots would be developed. Impacts associated with parking and trailheads would be the same as described in the RMD and would be adverse, site-specific, short- and long-term, and negligible.

### *Cumulative Impacts*

As within the RMD, past, present, and reasonably foreseeable future actions with potential to affect wildlife are related primarily to encroaching development around the park. Impacts of the no action alternative, when combined with the cumulative scenario, would have an overall adverse regional long-term moderate impact on wildlife. The no action alternative would provide a slight incremental increase to the overall cumulative impacts.

### *Conclusion*

Adverse wildlife impacts associated with a lack of formal trails leading to attraction sites are primarily related to the development of social trails to these areas. The closure of Golden Gate Road would eliminate motor vehicle traffic and provide a beneficial impact on wildlife. Overall, impacts would be both adverse and beneficial, local and site-specific, short- and long-term and negligible to minor. The no action alternative when combined with the cumulative scenario would have an overall adverse regional long-term moderate impact on wildlife. The no action alternative would provide a slight incremental increase to the overall cumulative impacts.

## Rincon Mountain District

### Alternative A

### *Manning Camp Planning Area*

Under alternative A, no new adverse impacts on wildlife would occur. No new trails would be constructed. The use of the Manning Camp Planning Area would be reduced, thereby reducing human pressure in a wilderness area. The removal of the Bonita Trail, and the restoration of the trail to natural conditions, would increase the amount of contiguous habitat available within the high country. Wildlife may be temporarily affected during the trail removal process of the plan as restoration crews may cause wildlife to avoid the area. However, wildlife would be positively affected due to the slight increase in contiguous habitat within this portion of the Manning Camp Planning Area. The removal of the Bonita Trail may have a beneficial indirect effect by reducing the amount of soil erosion that occurs from trail use.

The immediate impacts caused by the removal of Bonita Trail would be adverse, short-term, site-specific and of negligible intensity. In the long term, the removal of the trail would be beneficial, local, long-term, and negligible.

### *Southern Boundary Planning Area*

Under alternative A, the conversion of the Hope Trail to multiuse, and the trail’s extension and new access point, would create new negative impacts on wildlife, including increased disturbance. In addition, the Arizona Trail would connect to the Hope Camp Trail and would continue approximately 4.2 miles

northeast to a connection with the Manning Camp Trail. This trail would further contribute to habitat fragmentation and loss resulting in adverse, local, long-term, and negligible impacts. There may also be adverse, site-specific, short-term, negligible impacts from illegal camping. However, a formalized route within the park connecting to the Arizona Trail may noticeably reduce the creation of social trails. A comprehensive guidance plan for trail design and mitigation would be undertaken; social trails would be closed, and visitors would be diverted away from sensitive species habitats, resulting in beneficial local long-term minor impacts.

### *Cactus Forest Planning Area*

Under alternative A, three new trail sections would be created; nine trail sections would be closed and restored, and one trail would be rerouted. Additionally, three washes would be designated as trails. New trail construction would result in increased habitat fragmentation and reduced potential wildlife habitat. Allowing horses on wash trails may affect downstream water quality during and after rains and is likely to introduce weeds into the watershed. However, closure and restoration of redundant trails would reduce habitat fragmentation and subsequently change the distribution of individuals in a local area. Comprehensive guidance for trail design mitigation, signs, and standards would be undertaken; social trails would be closed, and visitors would be diverted away from sensitive species habitats, resulting in beneficial local long-term minor impacts. Overall, the effects on wildlife would be beneficial, local, long-term, and minor.

### *Foothills and Mountains Planning Area*

Under alternative A, no change would occur compared to the no action alternative. Impacts would be adverse, local, long-term, and negligible.

### *Parking, Access Points, and Trailheads*

Under alternative A, one new access point would be constructed, and another would be rerouted. The new access point at Ernie's Falls would allow travel to USFS lands, possibly creating more human pressure in a natural area adjacent to the park. Parking lot construction would reduce wildlife habitat. Additionally, parking lots constructed where washes would be backfilled could adversely impact riparian habitat and cause direct mortality to slower moving individual amphibians, such as toads, during construction. Overall, impacts would be adverse, local, long-term, and minor.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to alternative A.

Impacts associated with loss and fragmentation of habitat, soil erosion, reduction in water quality, introduction/increase of nonnative/exotic plant species, and loss of native vegetation would continue to adversely affect portions of the RMD. These impacts would be adverse, local, long-term, and negligible. Wildlife species dependent on lower elevation habitat (Sonoran Desertscrub and Semidesert Grassland) would be more affected by aspects of the cumulative scenario, such as encroaching development, than wildlife species living in the higher elevations (Interior Chaparral, Madrean Evergreen Woodland, and Petran Montane Conifer Forest). However, the closure of redundant trails and reduction of habitat fragmentation and the closure of social trails and implementation of comprehensive guidance for trail design mitigation, signs, and standards would benefit sensitive wildlife habitats.

Compared to the cumulative impacts expected under the no action alternative, under alternative A, these differences would be so small in relation to the past, present, and future effects of encroaching development as to result in no measurable difference. Cumulative impacts would be primarily adverse, regional, long-term, and moderate. Alternative A would provide no incremental increase to overall cumulative impacts.

### *Conclusion*

While alternative A contains some proposed actions with adverse effects on wildlife, overall, it is slightly beneficial to wildlife in the RMD. Under alternative A, beneficial effects on wildlife would include the closing and restoration of redundant trails, the closure of social trails, and the implementation of comprehensive guidance for trail design. Overall, effects on wildlife would be beneficial, local, long-term, and negligible to minor. Cumulative impacts would be primarily adverse, regional, long-term, and moderate. This alternative would provide no incremental increase to overall 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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Alternative B

### *Manning Camp Planning Area*

Under alternative B, there would be no change compared to the no action alternative. Impacts would be beneficial, local, long-term, and negligible.

### *Southern Boundary Planning Area*

Unlike Alternative A, under alternative B, bicycles would not be allowed on the Hope Camp Trail, and the North Hope Camp Trail would not be removed and restored to natural conditions. Therefore, there would be no change compared to the no action alternative, with the exception that two new trails and associated access points are proposed for this area, which would adversely affect wildlife by reducing habitat, increasing fragmentation, and increasing human pressure from a previously undeveloped area. Associated impacts would be adverse, local, long-term, and negligible.

Social trails would be closed, and comprehensive guidance for trail design, mitigation, signs, and standards would be implemented. Under this alternative, the Arizona Trail would enter the park on its western boundary to connect to the Tanque Verde Ridge Trail, which is in the Foothills and Mountains Planning Area. The social trails expected under the no action alternative relative to termination of the Arizona Trail at the Southern Boundary would not apply, and local effect on wildlife populations from the reduced human pressure would be beneficial. The overall effects on wildlife under alternative B in the Southern Boundary Planning Area would be beneficial, local, long-term, and minor.

### *Cactus Forest Planning Area*

Impacts under alternative B would be similar to alternative A, except a hiker only trail would loop around Javalina Rocks and Javelina Wash, and two of its tributaries would be designated as official trails. The new trail construction would result in habitat fragmentation and degradation. Allowing horses on wash trails may affect downstream water quality during and after rains and is likely to introduce weeds into the watershed. Fewer trails (6) would be removed and restored to natural conditions under alternative B compared to alternative A. Impacts would be similar to alternative A, but to a lesser extent because fewer trails would be restored. Comprehensive guidance for trail design mitigation, signs, and standards would be undertaken; social trails would be closed, and visitors would be diverted away from sensitive species habitats, resulting in beneficial local long term minor impacts. Overall, the effects on wildlife would be beneficial, local, long-term, and minor.

### *Foothills and Mountains Planning Area*

There would be no change compared to the no action alternative, with the exception that the Arizona Trail would enter the park in this area. Under alternative B, Arizona Trail users would connect with the existing

Tanque Verde Ridge Trail on the park's western boundary. No new trail would be created to provide access into the park, as would be the case under alternative A. Use of the Tanque Verde Ridge Trail would slightly increase the adverse effects of human disturbance on wildlife in the area. Overall, impacts would be adverse, local, long-term, and negligible.

### *Parking, Access Points, and Trailheads*

Under alternative B, impacts related to parking, access points, and trailheads would be similar to those in alternative A. Impacts would be adverse, local, long-term, and minor.

### *Cumulative Effects*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to alternative B, with some differences in certain areas. Most of the differences compared to alternative A would be so slight as to result in no measurable change to cumulative impacts. Combining increased access and new trails with increasing development would be an adverse regional long-term moderate impact. Alternative B would provide no incremental increase to overall cumulative impacts.

### *Conclusion*

Alternative B contains numerous proposed actions with beneficial effects on wildlife; overall, it would have slightly beneficial effects on wildlife in the RMD. Under alternative B, beneficial effects on wildlife would include the closing and restoration of redundant trails and the conversion of three trails to hiker only use. Adverse effects on wildlife include the construction of new trails, the opening of one wash and two of its tributaries to trails, and the creation of new parking, access points, and trailheads. Overall, effects on wildlife would be beneficial and adverse, local, long-term, and negligible to minor. Cumulative impacts would be adverse, regional, long-term, and moderate. Alternative B would provide no incremental increase to overall 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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Alternative C

### *Manning Camp Planning Area*

Under alternative C, there would be no change compared to alternative A. Impacts would be beneficial, local, long-term, and negligible.

### *Southern Boundary Planning Area*

The trail configuration for alternative C would be the same as the trail configuration in alternative B, except the Arizona Trail alignment under alternative C would be the same as described for alternative A. Impacts associated with the new trail configuration would be adverse, local, long-term, and negligible. Additionally, as in alternative A, bicycles would be allowed on Hope Camp Trail, and the North Hope Camp Trail would be removed and restored. A formalized route within the park connecting to the Arizona Trail may noticeably reduce the creation of social trails. As described in alternative A, under alternative C, comprehensive guidance for trail design mitigation, signs, and standards would be undertaken; social trails would be closed, and visitors would be diverted away from sensitive species habitats, resulting in overall beneficial local long-term minor impacts.

### *Cactus Forest Planning Area*

Impacts under alternative C would be similar to those described under alternative A. Under this alternative, a new multiuse trail would be constructed from Old Spanish Trail near Escalante Road and would connect to the Cactus Forest Trail. As in alternative B, a hiker only trail would be constructed around Javelina Rocks that would be accessed by Cactus Forest Loop Drive. In addition, a new trail originating at the proposed Freeman Road access would connect with the Shantz Trail. Similar to alternative B, Javelina Wash and its two tributaries south of the Cactus Forest Loop Drive would be designated as official trails. In addition, Loma Verde Wash, Monument Wash, Deer Valley Wash, and Bajada Wash would be designated as official trails. Nine existing trails would be removed and restored; social trails would be closed, and comprehensive guidance for trail design mitigation, signs, and standards would be undertaken under alternative C. Overall, impacts would be as described under alternative A; effects on wildlife would be beneficial, local, long-term, and minor.

### *Foothills and Mountains Planning Area*

Under alternative C, there would be no change compared to the no action alternative. Impacts would be adverse, local, long-term, and negligible.

### *Parking, Access Points, and Trailheads*

Under alternative C, impacts related to parking, access points, and trailheads would be similar to those in alternative A. Impacts would be adverse, local, long-term, and minor.

#### Cumulative Impacts

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to alternative C, with some differences in certain areas. Most of the differences compared to the no action alternative would be so slight as to result in no measurable change to cumulative impacts. Cumulative impacts from the implementation of alternative C would occur primarily from the creation of numerous new trails and access points as well as from designating five washes as trails. The increased human pressure that would result from the implementation of alternative C would result due to the direct loss and potential degradation of native habitat. Combining increased access and new trails with increasing development would be an adverse regional long-term moderate impact. Alternative C would provide no incremental increase to the overall cumulative impacts.

### *Conclusion*

The proposed actions under alternative C provide benefits to wildlife in the Manning Camp, Southern Boundary and Cactus Forest planning areas. Under alternative C, beneficial effects on wildlife would include the closing and restoration of redundant trails and the conversion of trails to hiker only use. Adverse effects on wildlife include the creation of new trails; the conversion of one trail to include mountain bikes; the designation of five washes as trails; and the creation of new parking, access points, and trailheads. Overall, impacts would be beneficial, local, long-term, and negligible to minor. Cumulative impacts would be adverse, regional, long-term, and moderate. This alternative would provide no incremental increase to the overall 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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

### Preferred Alternative

*Manning Camp Planning Area*

Under the preferred alternative, there would be no change compared to alternative A. Impacts would be beneficial, local, long-term, and negligible.

*Southern Boundary Planning Area*

Under the preferred alternative, impacts would be the same as alternative C; overall, impacts would be beneficial, local, long-term, and minor.

*Cactus Forest Planning Area*

Similar to alternative B, under the preferred alternative, fewer trails (7) would be removed and restored to natural conditions compared to alternative A, and two existing trails would be converted to hiker only. Impacts related to designating washes as trails would be similar to alternative C. Additionally, a new wash would be added to connect the Kennedy Trail with the Shantz Trail. Designating washes as trails and adding a new wash would result in adverse effects on wildlife as described in alternative A.

Overall, impacts under the preferred alternative would be similar to alternative B for the reasons stated under that analysis. Impacts of the preferred alternative would be beneficial, local, long-term, and minor.

*Foothills and Mountains Planning Area*

There would be no change under the preferred alternative compared to the no action alternative. Impacts would be adverse, local, long-term, and negligible to minor.

Parking, Access Points, and Trailheads

Under the preferred alternative, impacts related to parking, access points, and trailheads would be similar to those in alternative A. Impacts would be adverse, local, long-term, and minor.

Cumulative Impacts

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to the preferred alternative, with some differences in certain areas. Most of the differences compared to the no action alternative would be so slight as to result in no measurable change to cumulative impacts. Cumulative impacts from the implementation of the preferred alternative would occur primarily from the creation of numerous new trails and access points as well as the designation of washes as trails. The increased human pressure that would result from the implementation of this alternative would result due to the direct loss and potential degradation of native habitat and the degradation of watersheds downstream of the park. Combining increased access and new trails with increasing development would be an adverse regional long-term moderate impact. This alternative would provide no incremental increase to the overall cumulative impacts.

*Conclusion*

As in alternative C, the proposed actions under the preferred alternative provide some benefits to wildlife in the Manning Camp, Southern Boundary and Cactus Forest planning areas. Under the preferred alternative, beneficial effects on wildlife would include the closing and restoration of trails and the conversion of trails to hiker only use. Adverse effects on wildlife include the creation of new trails, with one expanded to include mountain bikes; the designation of washes as trails; and the creation of new parking and access points. Overall, impacts would be beneficial, local, long-term, and negligible to minor. Cumulative impacts would be adverse, regional, long-term, and moderate. This alternative would provide no incremental increase to the overall 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 or proclamation of Saguaro National

Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Tucson Mountain District

### Alternative A

*Northeast Corner Planning Area*

Under alternative A, there would be one formal trail expanded from an existing social trail along with an associated trailhead and access point. All other social trails in the area would be closed. Additionally, a trail crossing would be rerouted. While the expansion of a social trail and access would be a negative impact on wildlife, it is offset by the closing of the network of smaller social trails, and the implementation of comprehensive guidance for trail design mitigation, signs, and standards. Therefore, the effects on wildlife would be beneficial, local, long-term, and negligible.

*Northwest Planning Area*

Under alternative A, two new trails would be constructed, including an ADA compliant impervious surface trail. The other trail would provide access to Panther and Safford Peaks. Some social trails in the area would be restored.

There would be a loss of habitat associated with the construction of new trails, and the addition of a concrete trail would provide convenient access to larger numbers of people, most of whom would not be disabled, thereby increasing human pressure. Raptors may be disturbed by the construction and subsequent use of this trail. A formal trail to the two peaks would split habitat in a relatively undisturbed part of the park. Raptors would be adversely affected by the construction of this trail and the associated increased in human pressure. The implementation of alternative A in the Northwest Planning Area would be adverse, local, long-term, and minor.

*South Central Planning Area*

Under alternative A, five new trails would be constructed, including three connections and two ADA compliant trails. A new trail would connect Picture Rocks Wash with Prophecy Wash, and the Bajada and Dobe Wash trails would also be connected. However, converting washes to trails negatively impacts wildlife not only in the local area, but downstream as well. Allowing horses on wash trails may introduce weeds into the watershed. One trail would be restored, and as in the Northwest Planning Area, Golden Gate Road would be converted to a multiuse trail. This conversion, as described under the no action alternative, would generally be safer for wildlife and would provide beneficial, local, long-term, and negligible impacts. However, the total habitat loss from new trail construction would not be offset by the restoration of one trail. Overall, effects on wildlife would be both beneficial and adverse, local, long-term, and minor**.**

*East Boundary Planning Area*

Under alternative A, some social trails would be formalized, and the new network of trails would include a loop, which would be open to hikers and equestrians. The rest of the social trails would be closed. The increase in potential habitat from the restoration of social trails would be a beneficial local long-term minor impact.

*Parking, Access Points, and Trailheads*

Under Alternative A, four new access points and four new trailheads would be provided in areas that currently have none (the Northeast and Eastern planning areas) or few (the Northwest Planning Area).

Formalization of an existing access may result in increased human pressure at the site. New parking lot construction would reduce wildlife habitat. Additionally, parking lots constructed where washes would be backfilled could adversely impact riparian habitat and cause direct mortality of slower moving individual animals during construction. Overall, impacts would be adverse, local, long-term, and minor.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to this alternative, with some differences in certain areas.

Under alternative A, all planning areas of the district would allow more convenient access to features within the park; the decrease of habitat and an increase in fragmentation and human pressure would cumulatively affect wildlife throughout the TMD. The development with the greatest potential for adverse impacts would occur in the Northwest Planning Area. As most of the park and the surrounding area is already developed, this portion represents some of only relatively undisturbed acreage in the TMD.

Impacts associated with the loss and fragmentation of habitat, loss of native vegetation, increased human presence, reduction in water quality, and the increased potential for the introduction/increase of nonnative/exotic plant species, would adversely affect the southern and western portions of the TMD. Combining increased access and new trails with increasing development would be an adverse regional long-term moderate impact. This alternative would provide no incremental increase to the overall cumulative impacts.

### *Conclusion*

Actions under alternative A increase the number of trails, trailheads, and access points within all portions of the TMD. Social trails not formalized into new trails would be closed, and Golden Gate road would be closed to motor vehicles and converted to a multiuse trail, providing beneficial impacts on wildlife. Adverse impacts are related to the addition of new ADA compliant trails, and to a new trail that would open up the Panther and Safford Peaks to increased visitor use. Effects on wildlife from this alternative would be beneficial and adverse, local, long-term, and minor. Cumulative effects would be adverse, regional, long-term, and moderate. This alternative would provide no incremental increase to the overall 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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Alternative B

### *Northeast Corner Planning Area*

Changes under alternative B would be similar to alternative A, except three loops (instead of one) and three access points would be created. The formalization of the three loops would cause a decrease in habitat and an increase in habitat fragmentation. As described under alternative A, while the expansion of a social trail and access represents a negative impact on wildlife, it is offset by the closing of the network of smaller social trails and the implementation of comprehensive guidance for trail design mitigation, signs, and standards. Therefore, the effects on wildlife would be beneficial, local, long-term, and negligible.

### *Northwest Planning Area*

In the Northwest Planning Area, changes under alternative B would be similar to alternative A, but the ADA interpretive trail to the CCC camp would permit horses along the southern leg only. As described

under alternative A, impacts would be adverse, local, long-term, and minor, primarily as a result of formalized access to Panther and Safford Peaks.

### *South Central Planning Area*

Actions in alternative B would be similar to alternative A. As described in alternative A, connecting Picture Rocks Wash with Prophecy Wash would create potential adverse impacts on wildlife. Additionally, a new hiker and equestrian trail would be constructed from the Red Hills Visitor Center to the southwestern corner of the park. As in the no action alternative, Wild Dog Trail would remain, and Bajada and Dobe Wash Trails would not be connected. Similar to alternative A, under alternative B, the total habitat loss from new trail construction would not be offset by the restoration of social trails. Overall, effects on wildlife would be adverse, local, long-term, and negligible**.**

### *East Boundary Planning Area,*

Under alternative B, changes would be similar to alternative A, but a network of social trails that are accessed by the Veteran's access point, the Pipeline, and Abbington Roads would be converted to formal trails, and bicycles would be allowed on the Belmont Trail. As in alternative A, some social trails would be formalized, and some would be closed. Overall, the increase in potential habitat from the restoration of social trails would be beneficial, local, long-term, and negligible.

### *Parking, Access Points, and Trailheads*

Impacts associated with parking, access points, and trailheads would be the same under alternative B as under alternative A. Overall, impacts would be adverse, local, long-term, and minor.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to alternative B, with some differences in certain areas. Cumulative impacts with the implementation of alternative B would be similar in nature to alternative A. In addition, the designation of new trails and numerous new access points would contribute to further adverse impacts on wildlife. Overall, cumulative impacts would be adverse, regional, long-term, and moderate. This alternative would provide no incremental increase to the overall cumulative impacts.

### *Conclusion*

Impacts on wildlife under alternative B would be similar to alternative A. Under alternative B, adverse effects on wildlife would occur from the designation of a wash as a trail and the development of three new trails and multiple access points and trailheads. Designation of six social trails as formal trails and the creation of three access points would also occur. Benefits to wildlife would results from the conversion of a road to a trail and the restoration of several social trails. Overall, the effects on wildlife from this alternative would be beneficial and adverse, local, long-term, and minor. Cumulative effects would be adverse, regional, long-term, and moderate. This alternative would provide no incremental increase to the overall 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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

### Preferred Alternative

*Northeast Corner Planning Area*

Under the preferred alternative, two loop trails with three spur trails that connect to access points would be formalized from existing social trails. All other trails would be restored. As described under alternative A, while the expansion of a social trail and access would be a negative impact on wildlife, it would be offset by the closing of the network of smaller social trails and the implementation of comprehensive guidance for trail design mitigation, signs, and standards. Therefore, the effects on wildlife would be beneficial, local, long-term, and negligible.

*Northwest Planning Area*

Under the preferred alternative, changes would be the same as alternative B, with the addition of converting the Cactus Wren and Manville Trails to hiker and equestrian use. Impacts as described under alternative B would be adverse, local, long-term, and minor, primarily as a result of formalized access to Panther and Safford Peaks

*South Central Planning Area*

Under the preferred alternative, Picture Rocks Wash would connect with Prophecy Wash, and Bajada Wash would connect with Dobe Wash, resulting in potential adverse impacts on wildlife as described under alternative A. As under alternative B, a new trail would be constructed from the visitor center to the southwestern park boundary, and a new ADA compliant trail would loop off of this trail. Also as in alternative B, Wild Dog Trail would remain. However, under the preferred alternative it would be converted to hiker only. Overall, as in alternative B, impacts under the preferred alternative would be adverse, local, long-term, and negligible.

*East Boundary Planning Area*

As in alternative A, under the preferred alternative, some social trails would be formalized, and the rest would be closed. Two access points connected with this system would also be closed under this alternative. Picture Rocks Wash would be formalized as an official trail. (Adverse impacts associated with the designation of washes into trails is described under alternative A.) The total increase in potential habitat from restoration and subsequent decreased use of social trails would be beneficial to wildlife. Overall, as under alternative A, impacts on wildlife under the preferred alternative would beneficial, local, long-term and minor.

*Parking, Access Points, and Trailheads*

Impacts associated with parking, access points, and trailheads would be the same under the preferred alternative as alternative A. Overall, impacts would be adverse, local, long-term, and minor.

*Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to the preferred alternative, with some differences in certain areas. Cumulative impacts with the implementation of the preferred alternative would be similar in nature to alternative A. In addition, the designation of an additional wash, new trails, and numerous new access points would contribute to further adverse impacts on wildlife. Overall, cumulative impacts would be adverse, regional, long-term, and moderate. The preferred alternative would provide no incremental increase to the overall cumulative impacts.

*Conclusion*

Impacts on wildlife under the preferred alternative would be similar to alternative A. Under the preferred alternative, adverse effects on wildlife would occur from the creation of numerous trails (including ADA compliant trails) and the construction of new parking, access points, and trailheads. Benefits to wildlife

would results from the conversion of Golden Gate Road to multiuse and the restoration of social trails. Overall, the effects on wildlife from the preferred alternative would be beneficial and adverse, regional, long-term, and minor. Cumulative effects would be adverse, regional, long-term, and moderate. This alternative would provide no incremental increase to the overall 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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## *Threatened, Endangered, and Rare and Protected Wildlife Species*

### Methodology

Information regarding federally threatened and endangered species and information regarding rare and protected wildlife species was compiled and compared with the locations of proposed trails 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 where applicable. Intensity impacts on threatened and endangered species fall into three categories: no effect, may affect but not likely to adversely affect, and may affect but likely to adversely affect.

Potential impacts on rare and protected species are described in terms of type (are effects beneficial or adverse?), context (are the effects site-specific, local, or regional?), duration (are the effects short-term, lasting less than one year; or long-term, lasting more than one year?). The planning team qualitatively evaluated the intensities of effects on threatened and endangered species and rare and protected wildlife species as described in the "Intensity Thresholds" section.

### Intensity Thresholds

Analyses of the potential intensity impacts were based on information that was compiled on known threatened and endangered species. Predictions about short- and long-term site impacts were based on existing trail monitoring data from Saguaro National Park.

The intensity thresholds of an impact on threatened and endangered species are defined as follows:

- *No Effect*: The action would not cause any discernable effect on the species or critical habitat if present.
- *May affect but not likely to adversely affect*: The action would be expected to result in discountable effects on a species or critical habitat (i.e., extremely unlikely to occur and not able to be meaningfully measured, detected, or evaluated), or the effect would be completely beneficial.
- *May affect but not 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 thresholds of an impact on rare and protected wildlife species are defined as follows:

- *Negligible*: Impacts would result in no measurable or perceptible changes to a population or individuals of a species or resource regarding size, integrity, or continuity.

- *Minor*: Impacts would be measurable or perceptible but would be localized within a relatively small area. The overall viability of the species would not be affected, and if left alone, the species would recover.
- *Moderate*: Impacts would cause a change to a population or individuals of a species or resource (e.g., abundance, distribution, quantity, or quality). The change would be measurable and of consequence to the species or resource; however, the impact would remain localized.
- *Major*: Impacts on a population or large number of individuals of a species or resource would be substantial, highly noticeable, and permanent. The change would be measurable, and impacts would occur over a widespread geographic area.

According to the U.S. Fish & Wildlife Service's (USFWS) "Listed, Proposed and Candidate Species for Pima County" dated April 2008, there are 18 federally listed threatened, endangered, or candidate species in Pima County, Arizona. In addition, the brown pelican is proposed to be delisted, but it is not a bird expected to be found at Saguaro National Park; and two species — Gooddings onion and the San Xavier talussnail — are protected by conservation agreements although they are unknown to occur at Saguaro.

The 18 listed species include the ocelot, which has likely been extirpated in Arizona and whose presence in Arizona is considered unlikely; the jaguar, which was known to occur in the Rincons as late as the very early 1900s, but which is now so rare and local in southeastern Arizona that it is not reasonably expected to be in the park; and the lowland Chiricahua leopard frog, which despite many surveys and the known presence of lowland leopard frogs, has not been confirmed by park staff and other biologists as being in the Rincon Mountains (Don Swann, pers. comm.). Eleven of the remaining species are typically found in habitats that do not occur in Saguaro National Park (Desert pupfish, Gila chub, Huachuca water umbel, Kearney blue star, masked bobwhite, Nichol Turk's head cactus, Pima pineapple cactus, Sonoran pronghorn, southwestern willow flycatcher, Acuna cactus and Sonoyta mud turtle). For this reason, the proposed action is determined to have no effect on these species, without providing formal species accounts in this document.

The remaining four species on the list (Gila topminnow, MSO, yellow-billed cuckoo, and lesser long-nosed bat) are known to occur or have occurred in the park. In addition, two species of special concern within the park, the American peregrine falcon and cactus ferruginous pygmy-owl (pygmy owl), are further evaluated in this section.

## No Action Alternative

### Rincon Mountain District

**Mexican spotted owl** (*Strix occidentalis lucida*). The MSO habitat is located within the Manning Camp and Foothills and Mountains planning areas. Under the no action alternative, no changes are proposed within the known owl habitat, and no changes to use patterns of relevant trails are expected. Hiking and camping are two activities that occur within the MSO habitat; disturbances from visitors that are currently affecting the MSO would continue to occur. Thus, the MSO may be affected but is not likely to be adversely affected under the no action alternative.

**Yellow-billed cuckoo** (*Coccyzus americanus*). The Southern Boundary Planning Area contains riparian habitat with the potential to support yellow-billed cuckoos. Under the no action alternative, no trails would be added to the system within yellow-billed cuckoo habitat. Visitor use in the Southern Boundary Planning Area may increase as a result of the Arizona Trail, which would terminate outside the park near the southern boundary, potentially resulting in disturbance of sensitive habitat by the creation of social trails and by illegal camping that occurs as visitors attempt to continue farther into the park. Threats to the yellow-billed cuckoo in the park include habitat loss (largely due to lack of water during droughts) and human disturbances, which include trampling and degrading understory plants in riparian areas. The

yellow-billed cuckoo may be affected, but it is not likely to be adversely affected by the no action alternative.

**Lesser long-nosed bat** (*Leptonycteris curasoae yerbabuena*). Lesser long-nosed bats are only known to occur at one location in the RMD, which is off limits to hikers and horseback riders; therefore, impacts on lesser long-nosed bat roosting habitat are not anticipated.

Potential foraging habitat for the lesser long-nosed bat is located throughout both districts of the park where saguaros and/or Palmer's agave are located. Trail maintenance work could impact the saguaros and agave foraging habitat; however, conservation measures have been implemented to mitigate these impacts. The lesser long-nosed bat may be affected, but it is not likely to be adversely affected by the no action alternative.

**Gila topminnow** (*Poeciliopsis occidentalis occidentalis*). The Gila topminnow is considered extirpated in Saguaro National Park. However, the one site at which they were known to occur in the past has the potential for additional management action (USFWS, Arizona Ecological Services Field Office, pers. comm. 1997). This site is within the Foothills and Mountains Planning Area. Under the no action alternative, there would be a potential for disturbance from horses or humans to the proposed reintroduction site. If the Gila topminnow were to be re-introduced, it may be affected by disturbances to its habitat but would not likely be adversely affected under the no action alternative.

**American peregrine falcon** (*Falco peregrinus anatum*) . This bird was officially removed from the Federal List of Endangered Species by the USFWS in 1999. However, this designation called for federal agencies to monitor peregrine populations for the next five years. The NPS still continues to monitor peregrine populations within the park. Peregrines nest on ledges and potholes, or in small caves, on sheer cliff faces that are relatively inaccessible to mammalian predators and that also provide protection from weather extremes. Peregrine falcons in the Rincons breed, and almost certainly forage, at elevations above 6,000 feet. However, numerous winter sightings of peregrine falcons at the lower elevations of the RMD and vicinity suggest that these areas may be used by resident birds in the nonbreeding season, or by dispersing juveniles or other wintering peregrines. Hiking occurs within falcon habitat, and disturbances from visitors that are currently affecting the falcon would continue to occur. Thus, impacts on the American peregrine falcon would be adverse, site-specific, short-term, and negligible.

**Cactus ferruginous pygmy-owl** (*Glaucidium brasilianum cactorum*). On May 30, 2008, the USFWS announced that the pygmy owl may warrant federal protection as an endangered species under the Endangered Species Act (ESA). This decision followed an initial review of a petition seeking to protect the pygmy-owl and initiated the beginning of a 12 month status review. Both districts of the park provide potential pygmy owl habitats. If USFWS determines that listing the pygmy owl is warranted, it is their intent to also propose critical habitat to the maximum extent possible. The pygmy owl is currently protected in the United States pursuant to the *Migratory Bird Treaty Act*, which prohibits the taking of the pygmy owl or the possession of its parts. It does not address habitat.

Although historic accounts associate this subspecies with riparian woodlands and mesquite bosques in Arizona (Phillips et al. 1964, USFWS 1993), recent sightings in the state have generally been in the Arizona upland subdivision of the Sonoran Desertscrub and in the paloverde cacti mixed scrub series (Abbate et al. 1996). The lands in both districts of the park contain potential habitats for the pygmy owl. The RMD has riparian areas along stretches of Rincon Creek surrounded by dense saguaro stands and patches of dense mesquite and several mesquite bosques. The TMD is in general, a very lush, intact example of the Arizona upland division of Sonoran Desertscrub, with abundant saguaros, mesquite, palo verde, and ironwood. Unconfirmed records from the past twenty years indicate that pygmy owls inhabit(ed) both districts of Saguaro National Park (Saguaro National Park files). From 1994 to the present, park staff, Arizona Game and Fish Department (AGFD) biologists, private contractors, and volunteers have surveyed for the pygmy owls within and nearby the park. All of these surveys followed

protocols specified by AGFD at the time. To date there has only been one pygmy owl detection in the park resulting from these surveys.

Conservation measures implemented by the park's Trails Program would ensure that trail work would not impact habitat features important to pygmy owls (e.g., saguaros, trees greater than 4 inches in diameter). Impacts on pygmy owl would be adverse, site-specific, short-term, and negligible.

### *Cumulative Impacts*

Numerous past, present, and future impacts within Saguaro National Park have the potential to impact the quality and abundance of habitat and the movement and distribution of animals, potentially resulting in the disturbance of threatened and endangered species and rare and protected wildlife species. This includes impacts related primarily to cattle grazing, fire damage, and population growth.

The Saguaro National Monument was created in 1933 and approximately 80% of the monument was former USFS land which inherited six grazing allotments. Grazing continued on park lands until the mid-1970s when grazing was phased out. Grazing has caused indirect effects on threatened and endangered species. Grazing, combined with intermittent droughts, caused the park lands to become overgrazed, resulting in accelerated sheet erosion and formation of gullies in some areas due to channelizing of water flow in livestock trails. As described in the "Cumulative Impact Scenario" section above, cattle grazing in deserts undoubtedly trampled saguaro seedlings, keeping recruitment of this cactus low in the monument. Saguaro cacti have experienced visible declines, likely affecting the available forage for the lesser long-nosed bat. Overgrazing has been blamed for the alteration of natural conditions in this region, including the permanent loss of some surface soils which are important for vegetation growth such as of the saguaro cactus and the agave plant. Overgrazing has also removed grass cover, which has likely increased the frequency of fires in the area.

In addition to destroying vegetation and desert grasslands which are important for some foraging species, fire has the potential to directly affect threatened and endangered species. Over the past 20 years, the NPS has attempted to manage fire in the Saguaro National Park; however, the park is still far from achieving its management goals. The NPS has adopted new fire management guidelines that could prove to be both beneficial and adverse for threatened and endangered species. A biological evaluation of threatened, endangered, candidate species, and species of special concern was submitted to USFWS (per Section 7 of the ESA) for the *Fire Management Plan* (FMP). The implementation of the FMP as described in the "Cumulative Impact Scenario" section would likely result in damage of trails, structures, and signs; closure of trails, roads, and campsites; and the removal of vegetation, which could create new access to areas and result in additional social trails. These fire-management-related impacts have the potential to decrease roosting, habitat, and foraging for threatened and endangered species and rare and protected wildlife species while also reducing the potential impacts from humans on sensitive species areas.

As the population of Tucson continues to grow, and open spaces continue to diminish, the park is likely to experience more visitation and more associated wildlife disturbance and habitat loss. Urbanization and development increasingly surround the RMD.

When combined with other past, present, and foreseeable future actions, the no action alternative would provide no noticeable increase to overall cumulative impacts on threatened, endangered, or rare and protected wildlife species.

### *Conclusion*

With the designation of the no action alternative, the same environmental disturbances that are currently impacting the MSO, yellow-billed cuckoo, lesser long-nosed bat, Gila topminnow, American peregrine falcon and cactus ferruginous pygmy-owl would continue to occur; thus, the impacts associated with the above listed species would continue due to the effects of humans utilizing nondesignated trails within the park and the lack of trail management throughout the planning areas. Impacts on species of special

concern would be adverse, site-specific, short-term, and negligible. Threatened and endangered species may be affected, but are not likely to be adversely affected under the no action alternative. When combined with other past, present, and foreseeable future actions, the no action alternative would provide no noticeable increase to overall cumulative impacts on threatened, endangered, or rare and protected wildlife species.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

### Tucson Mountain District

**Mexican spotted owl, yellow-billed cuckoo, and Gila topminnow.** The TMD contains four distinct planning areas: Northeast Corner, Northwest, South Central, and East Boundary. Four of the six sensitive species (MSO, yellow-billed cuckoo, Gila topminnow, and American peregrine falcon) likely to occur within Saguaro National Park are not found within the TMD; therefore, these species would not be affected under the no action alternative.

**Lesser Long-Nosed Bat.** Foraging habitat for the lesser long-nosed bat is located throughout the TMD. Potential impacts on foraging habitat within the TMD are the same as those described within the RMD. The lesser long-nosed bat may be affected, but it is not likely to be adversely affected under the no action alternative.

**Cactus ferruginous pygmy-owl.** The TMD is in general, a very lush, intact example of Sonoran Desertscrub, providing potential pygmy owl nesting habitat with abundant saguaros, mesquite, palo verde, and ironwood. Trail work could impact pygmy owl habitat. Potential impacts on the pygmy owl as a result of diminished nesting habitat would be adverse, site-specific, short-term, and negligible.

#### *Cumulative Impacts*

Cumulative impacts described in the RMD would be the same in the TMD. When combined with other past, present, and foreseeable future actions, the no action alternative would provide no noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species.

#### *Conclusion*

As described in the RMD, the same disturbances that are currently impacting the lesser long-nosed bat and pygmy owl would continue to occur. Thus, the impacts associated with foraging habitat for the lesser long-nosed bat species and potential nesting habitat for the pygmy owl would continue throughout the planning areas. Potential impacts would be adverse, site-specific, short-term, and negligible.

Cumulative impacts described in the RMD would be the same in the TMD. When combined with other past, present, and foreseeable future actions, the no action alternative would provide no noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Rincon Mountain District

### Alternative A Analysis

**Mexican spotted owl.** Actions in the Manning Camp Planning Area of alternative A would be the same as the no action alternative with the exception of the removal and restoration of the Bonita Trail. Mexican spotted owls might be temporarily affected by this alternative; however, established conservation measures ensure that impacts on the MSO and its habitat would be minimized. Furthermore, the species might be positively impacted due to the reduction in human disturbance and increase in contiguous habitat within the Manning Camp Planning Area. Thus, the MSO may be affected but is not likely to be adversely affected under alternative A.

**Yellow-billed cuckoo.** Although alternative A proposes new trails within the Southern Boundary Planning Area, which includes the Arizona Trail, none of the new trails would access or go near yellow-billed cuckoo riparian habitat. However, smaller, unsuitable riparian habitats may be intersected by new trails within this planning area, and the yellow-billed cuckoo could potentially be impacted by humans hiking along stream channels, resting under trees, and being vocal within previously quiet locations. Yellow-billed cuckoos may be affected by the utilization of these smaller riparian habitats but are not likely to be adversely affected.

**Lesser long-nosed bat.** Saguaro and agave plant communities found within the Southern Boundary, Cactus Forest, and Foothills and Mountains planning areas provide foraging habitat for the lesser long-nosed bat and are anticipated to be impacted by new trail construction.

Within the Southern Boundary Planning Area, the addition of the Arizona Trail could impact some saguaros and agave. However, these would be few plants relative to their availability in the park, and the impacts would be very minor or negligible. The addition of two new access points and the conversion of the Hope Camp Trail to a multiuse trail for hikers, bicyclists, and horseback riders would likely increase visitor use in this area; however, the trail is already highly utilized. Within the Southern Boundary Planning Area, the lesser long-nosed bat may be affected by the addition of the Arizona Trail and increased multiuse of the Hope Camp Trail but is not likely to be adversely affected.

**Gila Topminnow.** The same impacts would be encountered as with the no action alternative in that if re-introduced, the Gila topminnow may be affected by alternative A, but it is not likely to be adversely affected.

**American peregrine falcon.** The falcon might be temporarily affected during the Bonita Trail removal process. However, the falcon would ultimately be positively impacted due to the reduction in human disturbance and increase in contiguous habitat within this area of the Manning Camp Planning Area. Thus, under alternative A, impacts on the American peregrine falcon would be beneficial, site-specific, long-term, and negligible.

**Cactus ferruginous pygmy-owl.** The pygmy owl would be affected by adverse impacts on the Arizona upland division of Sonoran Desertscrub as described under the lesser long-nosed bat section, additionally; the owl could be affected by hikers, bikers, and horseback riders that utilize trails within the Cactus Forest Planning Area. Impacts on the pygmy owl would be adverse, site-specific, short- and long-term, and negligible.

#### *Cumulative Impacts*

Cumulative impacts under alternative A in the RMD would be similar to those under the no action alternative in that threatened and endangered species may be affected but are not likely to be adversely affected. There would be no noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species.

#### *Conclusion*

The Comprehensive Trails Plan–alternative A, proposed for Saguaro National Park, decreases the number of trails within the northwest area of the park, increases the number of trails within the southwestern area of the park, and more or less adds and removes the same number of trails in the northwestern area of the park. Five sensitive species — MSO, lesser long-nosed bat, yellow-billed cuckoo, pygmy owl , and American peregrine falcon — are likely to be affected by alternative A. Habitat within the park would be restored for the MSO and American peregrine falcon with the removal of the Bonita Trail in the Manning Camp Planning Area. The yellow-billed cuckoo does not gain or lose habitat associated with the trail additions or removals, and may be affected but is not likely to be adversely affected under alternative A. The lesser long-nosed bat and the pygmy owl may be affected by the addition of trailheads, access points, and trails and the consequent increase in human disturbance. As a result, the lesser long-nosed bat may be affected but is not likely to be adversely affected under alternative A. Potential impacts on the pygmy owl would be adverse, site-specific, short- and long-term, and negligible. The endangered Gila topminnow, known historically to have occurred within Saguaro National Park, and with the potential to be re-introduced, would not be adversely affected under alternative A. Overall, these threatened and endangered species may be affected but would not be adversely affected. There would be no noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

### Alternative B Analysis

**Mexican spotted owl.** Under alternative B, the same impacts would be encountered as with the no action alternative. The MSO may be affected by alternative B, but it is not likely that the MSO would be adversely affected.

**Yellow-billed cuckoo.** Although alternative B proposes new trails within the Southern Boundary Planning Area, which includes the Arizona Trail, none of the new trails would access or go near the yellow-billed cuckoo riparian habitat; thus, the yellow-billed cuckoo may be affected but is not likely to be adversely affected.

**Lesser long-nosed bat.** The impacts associated with the Arizona Trail would be similar to those described under alternative A. The lesser long-nosed bat may be affected but is not likely to be adversely affected by Southern Boundary Planning Area alterations.

Within the Cactus Forest Planning Area, alternative B is similar to alternative A, with the exception of 6 trails being removed rather than 10; the Carillo and Garwood trails being converted to hiker only trails; and one wash (Javelina Wash), with two tributaries, being designated as trails rather than as three washes. The same impacts would be encountered as with alternative A, under alternative B, the lesser long-nosed bat may be affected but is not likely to be adversely affected.

**Gila Topminnow.** The same impacts would be encountered as with the no action alternative. If re-introduced, the Gila topminnow may be affected by alternative B, but it is not likely that the Gila topminnow would be adversely affected.

**American peregrine falcon.** The same impacts would be encountered as with the no action alternative. Thus, under alternative B, impacts on the American peregrine falcon would be adverse, site-specific, short-term, and negligible.

**Cactus ferruginous pygmy-owl.** As described under the lesser long-nosed bat section in alternative B, the same impacts on the pygmy owl nesting habitat would be encountered as with alternative A. Impacts

on the cactus ferruginous pygmy owl would be adverse, site-specific, short- and long-term, and negligible.

### *Cumulative Impacts*

Cumulative impacts under alternative B in the RMD would be similar to those under the no action alternative; threatened and endangered species are not likely to be adversely affected by alternative B. There would be no noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species.

### *Conclusion*

The proposed affects for alternative B are the same as those described under alternative A, except that the habitat associated with the MSO and American Peregrine falcon would not be altered from the no action alternative. Impacts on the pygmy owl resulting from the degradation of habitat would be adverse, site-specific, short- and long-term, and negligible. Threatened and endangered species may be affected but would not likely be adversely affected by alternative B. There would be no noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Alternative C Analysis
## Threatened and Endangered

**Mexican spotted owl.** The same impacts would be encountered as with the RMD alternative A. The MSO may be affected by alternative C, but it would not be adversely affected.

**Yellow-billed cuckoo.** The same impacts would be encountered as with the RMD alternative A. The yellow-billed cuckoo may be affected by alternative C, but it would not likely be adversely affected.

**Lesser long-nosed bat.** Saguaro and agave plant communities found within the Southern Boundary, Cactus Forest, and Foothills and Mountains planning areas provide foraging habitat for the lesser long-nosed bat and are anticipated to be impacted by new trail construction.

Within the Southern Boundary Planning Area, the same impacts would be encountered as with alternative A.

Within the Cactus Forest Planning Area, alternative C is similar to the previously mentioned alternatives A and B; however, the number of impacts on the lesser long-nosed bat would be increased because of the addition of four new access points rather than two, the addition of a multiuse trail from Old Spanish Trail and Escalante Road, the addition of a new trail from Freeman Road to the Shantz Trail, and the designation of five washes (Javelina Wash, Loma Verde Wash, Monument Wash, Deer Valley Wash, and Bajada Wash) as trails. Overall, as described in alternatives A and B, the lesser long-nosed bat may be affected but is not likely to be adversely affected.

**Gila topminnow.** The same impacts would be encountered as with the no action alternative. If re-introduced, the Gila topminnow may be affected but is not likely to be adversely affected under alternative C.

**American peregrine falcon.** Under alternative C, the same impacts would be encountered as with alternative A. Thus, impacts on the American peregrine falcon would be beneficial, site-specific, long-term, and negligible**.**

**Cactus ferruginous pygmy-owl.** As described under the lesser long-nosed bat section in alternative C, the same impacts on the pygmy owl nesting habitat would be encountered as under alternatives A and B. Impacts on the pygmy owl under alternative C would be adverse, site-specific, short- and long-term, and negligible.

### *Cumulative Impacts*

Cumulative impacts under alternative C in the RMD would be similar to those under the no action alternative in that threatened and endangered species are not likely to be adversely affected by this alternative. There would be no noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species.

### *Conclusion*

Effects on threatened and endangered species under alternative C are similar to effects described under alternative A with the exception that habitat impacts associated with lesser long-nosed bat and the pygmy owl would increase as compared to alternatives A and B. Impacts on the pygmy owl would be adverse, site-specific, short- and long-term, and negligible. Threatened and endangered species may be affected but are not likely to be adversely affected under alternative C.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Preferred Alternative Analysis
## Threatened and Endangered

**Mexican spotted owl.** Under the preferred alternative, the same impacts would be encountered as with the no action alternative. The MSO may be affected by the preferred alternative, but it would not be adversely affected.

**Yellow-billed cuckoo.** The same impacts would be encountered as with the RMD alternative B. The yellow-billed cuckoo may be affected by the preferred alternative, but it would not likely be adversely affected.

**Lesser long-nosed bat.** Saguaro and agave plant communities found within the Southern Boundary, Cactus Forest, and Foothills and Mountains planning areas provide foraging habitat for the lesser long-nosed bat and are anticipated to be impacted by new trail construction.

Within the Southern Boundary Planning Area, the same impacts would be encountered under the preferred alternative as with alternative A.

Within the Cactus Forest Planning Area, the preferred alternative is similar to alternative A, with the exception that 7 trails (Loma Verde [Pink Hill to Wentworth], Palo Verde [Shantz to Creosote], Kennedy [Carrillo to Wentworth], Wentworth [Kennedy to Wildhorse], Freight Wagon, and Reroute Saguaro north of Pink Hill [rename to Loma Verde]) would be removed rather than 10; the Wentworth Trail between Garwood and Douglas Springs trails would be converted to hiker only; the Mica View Trail considered for ADA and horses would be prohibited; 5 washes (Javelina Wash, Loma Verde Wash, Monument Wash, Deer Valley Wash, and Bajada Wash) would be designated as trails rather than 3; and a hiker only access would be installed at the northern boundary at Monument Wash. The effects would be the same as those described under alternative A. Under the preferred alternative, the lesser long-nosed bat may be affected but is not likely to be adversely affected.

**Gila topminnow.** The same impacts would be encountered under the preferred alternative as with the no action alternative. If re-introduced, the Gila topminnow may be affected by the preferred alternative but would not likely be adversely affected.

**American peregrine falcon.** The same impacts would be encountered under the preferred alternative as with the no action alternative. Thus, under the preferred alternative, impacts on the American peregrine falcon would be adverse, site-specific, short-term, and negligible.

**Cactus ferruginous pygmy-owl.** As described under the lesser long-nosed bat section of the preferred alternative, the same impacts on the pygmy owl nesting habitat would be encountered as with alternative A. Impacts on the pygmy owl would be adverse, site-specific, short- and long-term, and negligible.

*Cumulative Impacts*

Cumulative impacts under the preferred alternative would be similar to those described under the no action alternative. Threatened and endangered species may be affected but are not likely to be adversely affected by the preferred alternative. There would be no noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species.

*Conclusion*

The impacts associated with the preferred alternative are the same as described under alternative B, with the exception that habitat impacts associated with lesser long-nosed bat and the pygmy owl would be heightened within the Cactus Forest Planning Area as compared to alternatives A and B. However, the lesser long-nosed bat impacts are decreased within the preferred alternative plan when compared with the Cactus Forest Planning Area maintenance described in alternative C. Impacts on the American peregrine falcon would be the same as the no action alternative, adverse, site-specific, short-term, and negligible. Impacts on the pygmy owl would be adverse, site-specific, short- and long-term, and negligible due to potential degradation of nesting habitat. Threatened and endangered species may be affected by the preferred alternative but are not likely to be adversely affected.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Tucson Mountain District

### Alternative A Analysis

The lesser long-nosed bat, MSO, yellow-billed cuckoo, American peregrine falcon and Gila topminnow are not found in the TMD; therefore, alternative A has no effect on these species.

**Lesser long-nosed bat.** Potential foraging habitat for the lesser long-nosed bat is located throughout the TMD. Conservation measures implemented by the park's trail program ensure that foraging habitat for this species would not be impacted by trail work. Under alternative A, new trails, trailheads, and/or access points would be added, and Golden Gate Road would be converted to a multiuse trail. Social trails would be closed, which would reduce nondesignated off-trail impacts occurring within the bat's foraging habitat. Under alternative A, the lesser long-nosed bat may be affected, but it is not likely to be adversely affected.

**Cactus ferruginous pygmy-owl.** The TMD is, in general, a very lush, intact example of Sonoran Desertscrub, providing potential pygmy owl habitat with abundant saguaros, mesquite, palo verde, and ironwood. Actions described above under the lesser long-nosed bat for alternative A would not affect

pygmy owls or their habitat due to the conservation measures employed by the park's trail crews. Any adverse impacts on pygmy owls or their habitat would be site-specific, short-term, and negligible.

### *Cumulative Impacts*

Cumulative impacts under alternative A in the TMD would be similar to those described under the no action alternative. Threatened and endangered species may be affected but are not likely to be adversely affected by alternative A. There would be no noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species.

### *Conclusion*

Effects on the lesser long-nosed bat under alternative A for the TMD are similar to those in the RMD in that the species may be affected but is not likely to be adversely affected. Employed conservation measures would mitigate any potential impacts on pygmy owls or their habitat. Any adverse impacts would be site-specific, short-term, and negligible. There would be no noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Alternative B Analysis
## Threatened and Endangered

**Mexican spotted owl, yellow-billed cuckoo, and Gila topminnow.** These species do not occur in the TMD; therefore, they would not be affected by alternative B.

**Lesser long-nosed bat.** The impacts as described under alternative A would be the same for alternative B. The lesser long-nosed bat may be affected, but it is not likely to be adversely affected.

**Cactus ferruginous pygmy-owl.** The impacts as described under alternative A would be the same for alternative B. Potential impacts would be adverse, site-specific, short-term, and negligible.

### *Cumulative Impacts*

Cumulative impacts under alternative B in the TMD would be similar to those under the no action alternative. There would be no noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species.

### *Conclusion*

Impacts on threatened and endangered species under alternative B are similar to those under alternative A in that the lesser long-nosed bat may be affected, but it is not likely to be adversely affected. Potential impacts on the pygmy owl would be adverse, site-specific, short-term, and negligible. There would be no noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

### Preferred Alternative Analysis
### Threatened and Endangered

**Mexican spotted owl, yellow-billed cuckoo, and Gila topminnow.** These species do not occur in the TMD; therefore, they would not be affected by the preferred alternative.

**Lesser long-nosed bat.** The same impacts would be encountered under the preferred alternative as with the TMD alternative A. The lesser long-nosed bat may be affected by the preferred alternative, but it is not likely to be adversely affected.

***Cactus ferruginous pygmy-owl.*** The impacts as described under alternative A would be the same for the preferred alternative. Potential impacts would be adverse, site-specific, short-term, and negligible.

*Cumulative Impacts*

Cumulative impacts under the preferred alternative in the TMD would be similar to those under the no action alternative. There would be no noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species.

*Conclusion*

Impacts on threatened and endangered species under the preferred alternative are similar to those under alternative A. Species may be affected by the preferred alternative, but they are not likely to be adversely affected. Potential impacts on the pygmy owl would be adverse, site-specific, short-term, and negligible. There would be no noticeable increase in overall cumulative impacts on threatened, endangered, or rare and protected wildlife species.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## *Soils*

## Methodology

Information on existing soils in the planning areas was gathered from a literature review, electronic data sources, and agency coordination. Information about the soils was then compiled and compared with the locations of proposed developments and other actions. The impact analysis was based on soils information from the National Resource Conservation Service (NRCS) and park staff observations on the effects on soils from both visitor use and construction activities. The impact analysis was also based on the knowledge and best professional judgment of planners and biologists and studies of similar actions and effects, when applicable.

## Intensity Thresholds

Within this analysis, impacts on soil in the park were assessed based on the type of proposed action, and impacts were compared to the available scientific literature and general ecology. Proposed actions were rated using two sets of criteria: type and intensity.

***Type*** determination included the following criteria:

- Effect (beneficial, adverse, or no discernable effect),
- Context (site-specific, local, or regional),

- Duration (short-term, lasting less than one year; or long-term, lasting more than one year).

***Intensity*** thresholds of soil impacts are defined 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.

## No Action Alternative

The no action alternative represents current conditions and is also a baseline for comparison of the action alternatives. Under this alternative, the park would continue to manage trails without a comprehensive plan for a balanced and sustainable trail system. Social trails would not be converted to official trails, and a majority of them would eventually be closed and restored.

### Rincon Mountain District

The no action alternative would affect soils in each of the planning areas as follows:

#### *Manning Camp Planning Area*

Under the no action alternative, the current configuration of trails in the Manning Camp Planning Area would remain unchanged. No new trails would be constructed, and trail maintenance activities would continue as under current conditions. As stated in chapter 2 under the GMP, use of the Manning Cabin would be reduced, and wilderness values would be improved.

The current condition of trails in the Manning Camp Planning Area would remain the same under the no action alternative. Comprehensive guidance for trail design, mitigation, signs, and standards would not be undertaken.

Affected soils in the Manning Camp Planning Area consist of moderately steep and steep gneissic and granitic hills and mountains associated with Spudrock and Cortaro soil series. Both of these soil series are predominant on steep hills and mountains and are comprised primarily of sandy loams and rock outcrops. As described in chapter 3, these soils have very slight to severe erosion potential and severe revegetation limitations due to the risk of erosion (NPS 2008c).

Recreational uses (e.g., hiking, biking, and horseback riding) of trails comprised of desert soils rapidly eliminates the surface organic layer leading to possible compaction and an increase in surface runoff (Hammitt and Cole 1998). It is not the act of trampling that necessarily causes soil erosion; rather, erosion is caused mostly by wind and water processes (Hammitt and Cole 1998). Trampling by hikers, bikers, and horses may, however, increase the rate of erosion by destroying the vegetation that holds soils in place and displacing the surface soil layers. As described in the "Visitor Use and Experience" section, visitor

use in the Manning Camp Planning Area, which only allows hiking and horseback riding, is very low. Soil displacement is especially prevalent when horses, as opposed to hikers, use a trail because they tend to create gully-type erosion features (Hammitt and Cole 1998). Soils that are wet when trampled are also subject to a greater amount of compaction. Gully erosion is a problem in recreation management because water is concentrated in channels, thus increasing its erosive power (Hammitt and Cole 1998). On steep slopes, such as those in the Manning Camp Planning Area, gullies are intensified, thereby causing more water erosion than on gentler slopes (Weaver and Dale 1978).

Under the no action alternative, soil degradation due to trampling from hikers and equestrians would continue to result in a loss of organic matter, making soils more prone to compaction, reduced water infiltration, surface runoff, and irreversible erosion. Because the no action alternative does not include a comprehensive plan for trail design, maintenance, and mitigation, the impacts on soils would be intensified. Activity on the trail would continue to loosen and erode soils, and impacts from improper trail repair as a result of insufficient plans and funds would continue to increase. Continued impacts on soils under the no action alternative would be adverse, long-term, site-specific, and moderate.

### *Southern Boundary Planning Area*

Under the no action alternative, the current configuration of trails in the Southern Boundary Planning Area would remain the same. Newer expansion lands in the southern section of the district would not be evaluated for new trail opportunities. Additionally, a new route connecting to the Arizona Trail would not be considered, and social trails would continue to develop. As a result, opportunities for partnership and volunteer support or funding related to a connection with the Arizona Trail would not occur.

The soils in the Southern Boundary Planning Area consist of gravelly and sandy loam soils occurring on 5% to 65% slopes, predominantly from the Cellar, Chiminea, Deloro, Lampshire, and Pantano soil series. As described in “Chapter 3: Affected Environment,” and similar to the soils in the Manning Camp Planning Area, the Southern Boundary Planning Area soils have very slight to severe erosion potential and severe revegetation limitations due to erosion and shallow, droughty, or stony soils (NPS 2008).

Although this area is made up of some different soil types than those in the Manning Camp Planning Area, both areas have predominantly loamy soils with similar properties. As described in the “Visitor Use and Experience” section, visitor use in this area and in the Manning Camp Planning Area is very low. Based on this information, it is likely that effects on soils under the no action alternative in the Southern Boundary Planning Area would be the same as those described in the Manning Camp Planning Area. Impacts would be adverse, long-term, site-specific, and moderate.

### *Cactus Forest Planning Area*

Under the no action alternative, many redundant and maintenance-dependent trails (resulting from intense use) in this area would remain. The widened and braided trails that currently exist as a result of poor design and high use would not be redesigned or rerouted, and use of social trails would continue to cause erosion and associated problems, such as deep gullies within trail beds.

The no action alternative would lead to the eventual closure of all social trails, thus limiting visitor access in the Cactus Forest Planning Area. Visitors, however, would likely form new social trails in other areas because the park would not evaluate or develop more properly designed trails that could better handle the high intensity of use of the Cactus Forest Planning Area. It is easier and more effective to prevent impacts such as shortcutting with proper trail design, which can encourage visitor behavior through subtleties of design, rather than education programs or regulations (FHWA 1994). Under this alternative, proper trail design to address these issues would not occur.

The soils in the Cactus Forest Planning Area consist of 0% to 65% slopes with Anthony, Arizo, Cellar, Chimenea, Palos Verdes, and Pinaleno Soil. Similar to the Southern Boundary and Manning Camp planning areas, the soil complexes that predominantly make up these series are sandy, gravely, and cobbly

loams (NPS 2008). The major difference is that the soils in the Cactus Forest Planning Area occur on gentler slopes that receive more visitor traffic.

Impacts on soils would be similar to those described in the Manning Camp Planning Area for the no action alternative; however, erosion and compaction would be more likely to occur due to the high-intensity use on these trails. Because the trails in the Cactus Forest Planning Area are less steep than the other areas in the district, there is a corresponding increase in equestrian use. As previously discussed, equestrian use of trails causes greater adverse effects than that of hikers; therefore, the lack of maintenance and planning would cause degradation that would likely be greater in the Cactus Forest Planning Area than in any other area of the park. Additionally, trails that are located near washes have a greater chance of experiencing water erosion associated with flash floods (Hammitt and Cole 1998).

Negative impacts are likely to affect soils under the no action alternative for the Cactus Forest Planning Area. The Cactus Forest Planning Area receives the greatest amount of use, and like the other planning areas, does not have a comprehensive trail management plan. The lack of a specific plan to maintain and plan trails in the Cactus Forest Planning Area, coupled with a greater chance of water erosion from the washes in this area of the RMD, has the potential to alter topsoil and cause a small amount of additional erosion to soils. Effects on soils under the no action alternative in this area would be adverse, long-term, site-specific, and moderate.

### *Foothills and Mountains Planning Area*

Under the no action alternative, no trails would be restored, and no new trails would be constructed in the Foothills and Mountains Planning Area. The type of use allowed would remain the same, and trail maintenance activities would continue as under current conditions.

The soils in the Foothills and Mountains Planning Area consist of 5% to 65% slopes associated with Cellar, Chimenea, Cortaro, and Spudrock soils. Similar to the Southern Boundary, Manning Camp, and Cactus Forest planning areas, the soil complexes that predominantly make up these series are sandy, gravely, and cobbly loams. Erosion potential in the Foothills and Mountains Planning Area is very slight to severe, and there are severe limitations for revegetation due to erosion (NPS 2008).

This area of the park receives relatively low visitor use, with the exception of the Douglas Spring Trail, the Douglas Spring Camping Area, and the Tanque Verde Ridge Trail. These trails receive greater use than others in the area; however, visitation is not as great as is observed in the Cactus Forest Planning Area. Visitation is greater than that observed in the Southern Boundary and Manning Camp planning areas. Bikes are not allowed in the Foothills and Mountains Planning Area.

Negative effects on soils due to vegetation loss, erosion, and compaction are expected to occur under the no action alternative in the Foothills and Mountains Planning Area. Impacts on soils would likely be intensified along the Douglas Spring and Tanque Verde Ridge Trail because they are high-use areas. Since this area would not have the guidance of a formal trail management plan, impacts on soils would be adverse, long-term, site-specific, and moderate.

### *Cumulative Impacts*

The past, present, and reasonably foreseeable future actions with potential to affect soils are related primarily to cattle grazing and fire damage. The Saguaro National Monument was created in 1933, and approximately 80% of the monument was former USFS land which inherited six grazing allotments (Clemensen 1987). Grazing continued on park lands until the mid-1970s when grazing was phased out of the park lands. Grazing, combined with intermittent droughts, caused the park lands to become overgrazed. This resulted in accelerated sheet erosion and formation of gullies in some areas, caused by channelizing of water flow in livestock trails (similar to the effects observed as a result of horse use on recreational trails). Overgrazing has been blamed for the alteration of natural conditions in this region including the permanent loss of some surface soils which are important for vegetation growth.

Overgrazing has also removed grass cover, which has likely increased the frequency of fires in the area (Clemensen 1987, Bahre 1995). Although fire does not directly affect soils, it destroys vegetation and desert grasslands, which stabilize soils. Shrubs, grasses, and trees have the potential to break up the intensity of severe rainstorms and shield soils from winds (Moench and Fusaro 2008). The destruction of vegetation would remove this valuable soil protection, leaving the soil vulnerable to wind and water erosion. Fires have also been known to create a gas due to the combustion of vegetative materials that penetrates the soil profile and forms a waxy coating on the surface of the soil (Moench and Fusaro 2008). This causes the soil to repel water, which increases the rate of water runoff and reduces the percolation rate into the soil profile. This reduces the potential for vegetation to grow back following a fire.

Over the past 20 years, the NPS has attempted to manage fire in the Saguaro National Park; however, the park is still far from achieving this goal. The NPS has adopted new fire management guidelines that could prove to be both beneficial and negative for soils. The FMP, as described in the "Cumulative Scenario" section, would likely damage trails, structures, and signs; close trails, roads, and campsites; and remove vegetation, which could possibly create new access to areas, resulting in additional social trails. Conversely, the FMP has the potential to be beneficial for soils in that it could reduce the destruction of vegetation.

Past and present visitor use has contributed to gradual erosion and loss of soils on trails throughout the RMD. As stated in the "Visitor Use and Experience" section, as the population of Tucson continues to grow and open spaces continue to diminish, the park is likely to experience more visitation and more associated soil erosion. Under the no action alternative, the NPS would continue to perform trail repair and mitigation according to prioritized need and funding. However, given the existing staffing levels which are insufficient to perform the needed trail work, soils would continue to be adversely affected by increased visitor use that is growing at a rate faster than can be mitigated for. The cumulative impacts on soils would be adverse, long-term, site-specific, and moderate. When combined with other past, present, and foreseeable future actions, the no action alternative would provide a clearly detectable change in overall cumulative impacts.

### *Conclusion*

The no action alternative would continue to result in an overall degradation of soils in the planning areas. Hiking, biking, and equestrian activity on the trails would continue to loosen and erode soils within the RMD. Some of the trails within the RMD would continue to experience greater degrees of impacts, depending on soil and trail characteristics and trail use. Those experiencing the greatest effects would be trails located in the Cactus Forest Planning Area, and trails located on steep slopes. Areas of improper trail repair, loss of vegetative cover, and existing social trails have been identified and would continue to pose a problem in the RMD under the no action alternative. Overall, the no action alternative impacts on soil would be adverse, long-term, site-specific, and moderate.

As stated above, cumulative impacts from past, present, and foreseeable future actions in the RMD with the no action alternative would be adverse, long-term, site-specific, and moderate based on the fact that they would provide a clearly detectable change in soils.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Tucson Mountain District

The current configuration of trails in the TMD would remain the same under the no action alternative. Similar to the RMD, social trails would continue to develop adjacent to wash banks, which function as

important wildlife and vegetation corridors. New trail connections in the central and southern parts of the park would not be considered. Access points and trailheads would not be formalized, and trail types would remain the same. Additionally, illegal use of all-terrain vehicles (ATVs), use of old roadways, wildcat trail use, and jeep trails would continue. The park is currently working on completing a boundary fence to prevent the illegal off-road travel into the park; however, until this boundary fence is complete, illegal use of ATVs would continue to occur. Under the no action alternative, trails would continue to be managed without a comprehensive plan for a balanced and sustainable trail system.

The lower slopes of the mountains in the TMD are covered by terrace deposits or other alluvium, sometimes up to 400 feet thick (NPS 1995). Soils in the TMD are coarsely textured, well-drained, and occur on gentle slopes. As described in chapter 3, erosion potential of soils in the TMD ranges from very slight to severe. Many soils in the TMD occur on fan terraces, which create greater erosion potential. Recreational use of desert soils rapidly eliminates the surface organic layer. This, combined with vegetation loss and soil loss due to wind and water, also contributes to severe degradation of soils.

The TMD contains four distinct planning areas; Northeast Corner, Northwest, South Central, and East Boundary. The no action alternative would affect soils in each of the planning areas as follows:

### *Northeast Corner Planning Area*

No official trails exist in this area, and none are planned under the no action alternative. Additionally, washes would not be evaluated for suitability as trails, and all social trails would eventually be closed. Access to state land located within this area is not possible without a permit; no trails access the state parcel.

Soils in the Northeast Corner Planning Area consist of 1% to 55% slopes and are predominantly comprised of the Anklam, Pantano, Pinaleno, and Tubac soil series. These soils primarily consist of sandy and gravelly loams, with slight to severe erosion potential, and have severe revegetation limitations due to the risk of erosion (NPS 2008).

A continued lack of trail routes in this area would be readily apparent, resulting in an adverse localized long-term minor impact. Social trails would continue to develop, and hikers would continue to trample vegetation and other sensitive resources. This, in turn, would cause an increase in wind and water erosion and soil compaction. This area of the park is rarely used because of its lack of trails. Low recreational use of trails causes the most change in soils with further use causing less additional impact (Hammitt and Cole 1998). This effect is intensified in soils that have varying particle sizes, such as the loams in the Northeast Corner Planning Area.

### *Northwest Planning Area*

There are currently no official trails that access the CCC area in the Northwest Planning Area. Several social trails exist that provide access to the area, but these would eventually be closed. Under the no action alternative, no new trails would be formalized or created to access the CCC camp area. No trail access would be provided to Panther or Stafford Peaks. Some official trails exist that provide access to sections of the Northwest Planning Area that are designated as wilderness, but no new trails would be developed to provide access to this area.

Soils in the Northwest Planning Area consist of 1% to 55% slopes and are predominantly from the Anklam, Hayhook, Pantano, and Pinaleno soil series. These soils have similar properties to those in the Northeast Corner Planning Area in that they mostly consist of sandy and gravelly loams with slight to severe erosion potential and have severe limitations for revegetation because of the risk of erosion (NPS 2008).

Lack of established trails would encourage visitors to create social trails, therefore, increasing the potential of water and wind erosion and heavy compaction. The no action alternative would likely result

in a noticeable, slight, and localized change to soils, especially in areas where use is infrequent. An adverse localized long-term minor impact would take place under the no action alternative.

### *South Central Planning Area*

Golden Gate Road would be closed to motor vehicle access and converted to a multiuse trail that would be maintained as an official trail. In the west side of the South Central Planning Area, trails and picnic areas would remain closed to horse use.

As described in chapter 3, soils in the South Central Planning Area consist of 1% to 60% slopes with Anklam, Chimenea, Hayhook, Palos Verdes, Pantano, Pinaleno, and Saguaro soils. These soils have similar properties as those in the other three planning areas in that the majority of the complexes are made up of sandy or gravelly loams (NPS 2008).

Because so few trails exist throughout the other planning areas in the TMD, the trails in the South Central Planning Area experience the highest intensity visitor use. Recreation on these existing trails from hikers and equestrians would continue to loosen soils, creating gullies and increasing erosion. As previously mentioned, the soils in the South Central Planning Area predominantly consist of loams and are therefore subject to compaction and reduced water infiltration. Following the initial conversion of Golden Gate Road from a gravel road to a multiuse trail, continued use would likely have the same adverse affects on soils as described above; however, if this trail is properly maintained, these effects have the potential to be reduced. The no action alternative does not include a comprehensive plan for trail design, maintenance, and mitigation. The impacts on soils would be intensified due to little or no maintenance of existing trails, trail widening by recreational users, and lack of control over creation of social trails. Based on the impacts described above, effects on soils in the South Central Planning Area under the no action alternative would be adverse, long-term, site-specific, and minor.

### *East Boundary Planning Area*

Few official trails currently exist in the East Boundary Planning Area. Under the no action alternative, no new trails would be developed, and trail use would be limited to the Camino de Cerro trailhead. Trails to Wasson Peak and to a windmill would remain, but no official access to other popular destinations in the lower section of the TMD would be provided.

Soils in the East Boundary Planning Area consist of 1% to 60% slopes and are predominantly from the Anklam, Pantano, Pinaleno, and Tubac soil series. These soils are similar to those in the Northeast Corner and Northwest planning areas in that they mostly consist of sandy and gravelly loams with slight to severe erosion potential and have severe limitations for revegetation because of the risk of erosion (NPS 2008).

Consistent with the Northeast Corner and Northwest planning areas, a continued lack of trail routes in this area would be readily apparent, resulting in an adverse localized long-term minor impact. Social trails would continue to develop as hikers attempt to access popular destinations and proposed wilderness areas. Hikers and equestrians would continue to trample vegetation and other sensitive resources. This, in turn, would cause an increase in soil compaction and erosion. This area of the park is rarely used because of its lack of trails. Low recreational use of trails causes the most change in soils with further use causing less additional impact (Hammitt and Cole 1998). This effect is intensified in soils that have varying particle sizes, such as the loams in the East Boundary Planning Area.

### *Cumulative Impacts*

The same general scenario of past, present, and reasonably foreseeable future actions that apply to the RMD would also apply to the TMD, with the exception that the TMD does not have a history of grazing. Implementation of the FMP would affect soils in the TMD to the same extent as in the lower elevations of the RMD.

Overall, because soil properties are similar in both the TMD and RMD and because the cumulative impacts for the no action alternative in the TMD are similar to those in the no action alternative for the RMD, cumulative impacts would be similar in both districts. It is likely that cumulative impacts in the TMD would provide only a small incremental increase to impacts on soil. Effects from recreation would not be as prevalent as those in the RMD because fewer people use the backcountry of the TMD compared to the RMD. Cumulative impacts in the TMD would result in impacts that result in slightly altering soil profiles in a way that would be noticeable; therefore, cumulative impacts on soils would be adverse, long-term, site-specific, and minor.

#### *Conclusion*

Under the no action alternative, soil degradation due to trampling from hikers, bikers, and equestrians would continue to result in a loss of surface soils, making soil more prone to compaction, reduced water infiltration, surface runoff, and irreversible erosion. Because the no action alternative does not include a comprehensive plan for trail design, maintenance, and mitigation, the impacts on soils would be intensified due to little or no maintenance of existing trails, trail widening by recreational users, and lack of control over creation of social trails. Activity on the trail would continue to loosen and erode soils, and impacts from improper trail repair as a result of insufficient plans and funds would be noticeable and would continue to increase. The TMD differs from the RMD in that this district has lighter use by visitors. Overall, impacts on soils under the no action alternative would be adverse, long-term, site-specific, and minor in the TMD. Cumulative impacts on soils would also be adverse, long-term, site-specific, and minor.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Rincon Mountain District

### Alternative A Analysis

Alternative A would affect soils in each of the planning areas as follows:

#### *Manning Camp Planning Area*

Affected soils in the Manning Camp Planning Area consist of moderately steep and steep gneissic and granitic hills and mountains predominantly from the Spudrock and Cortaro soil series. Both of these soil series are predominant on steep hills and mountains and are comprised primarily of sandy loams and rock outcrops. As described in chapter 3, these soils have very slight to severe erosion potential and severe revegetation limitations due to the risk of erosion (NPS 2008).

The same environmental disturbances that are currently impacting soils would continue to exist under alternative A. As previously stated, the Manning Camp Planning Area receives very light trail use by park visitors; however, the risk of wind and water erosion due to vegetation loss from continued trail use would continue to impact the Manning Camp Planning Area. The removal of the Bonita Trail and the restoration of the former trail to natural conditions would decrease the risk of soil degradation and erosion in the Manning Camp Planning Area. Soil erosion cannot be reversed, but further erosion can be prevented with the removal of this trail. The reduction in erosion could potentially reduce the amount of sediment that enters the headwaters of some of the park's streams. The removal of the Bonita Trail could increase the use of other trails in the Manning Camp Planning Area, but this is unlikely due to the fact that the Manning Camp Planning Area experiences very little use. Although the removal of the Bonita Trail would likely be beneficial to soils in the area, the benefit is small when compared to the rest of the

planning area. Given these factors, impacts on soils under alternative A would be adverse, long term, site-specific, and negligible due to the fact that any changes in soils would be immeasurable.

### *Southern Boundary Planning Area*

The soils in the Southern Boundary Planning Area consist of gravelly and sandy loam soils with 5% to 65% slopes, predominantly from the Cellar, Chiminea, Deloro, Lampshire, and Pantano soil series. As described in "Chapter 3: Affected Environment," and similar to the soils in the Manning Camp Planning Area, these soils have very slight to severe erosion potential and severe revegetation limitations due to the risk of erosion (NPS 2008).

Conversion of the Hope Camp Trail to a multiuse trail could locally and slightly increase the erosion of soils on this trail. NPS staff observations indicate that soil erosion and loss have been exacerbated by the "cupping" of the cross-section of a trail. This cupping is caused by repeated use in the center of the trail (NPS 2002). During rainstorms, water is funneled down the center of the trail and does not dissipate outside the trail, thereby causing additional runoff which could potentially end up in the headwaters of some of the park's streams. Multiuse trails may, however, have beneficial impacts by redistributing soils across the trail (NPS 2002). Soils may be loosened from the sides of the trail by hiker and bicycle use and then subsequently be redistributed into the center of the trail by horses and hikers (NPS 2002). Sandy and gravelly loam soils occur in the Southern Boundary Planning Area. These soils are sensitive to compaction but have the potential to loosen near the surface from shrink-swell during wetting and drying cycles (Webb 1983). Additional soil loss would likely occur from the added visitation resulting from a new access point.

The addition of the Arizona Trail to the Southern Boundary Planning Area has the potential to impact soils by causing additional erosion and degradation in an area that was previously not utilized by hikers. Soils would also be adversely impacted in the short term by the general construction of this new trail. Although the creation of a new trail has the potential to adversely affect soils, it may also help reduce the creation of social trails in the Southern Boundary Planning Area because it would create continuity within the park by linking the Hope Camp Trail to the Manning Camp Trail and provide access to the Arizona Trail.

The same environmental disturbances that are currently impacting soils would continue to exist under alternative A. The risk of erosion due to vegetation loss, continued trail use, and wind and water erosion would continue to result in a clearly detectable impact in the Southern Boundary Planning Area. Given these factors, continued and new impacts on soils would be adverse, short- and long-term, site-specific, and moderate in the Southern Boundary Planning Area.

### *Cactus Forest Planning Area*

The soils in the Cactus Forest Planning Area consist of 0% to 65% slopes associated with Anthony, Arizo, Cellar, Chimenea, Palos Verdes, and Pinaleno soil series. Similar to the Southern Boundary and Manning Camp planning areas, the soil complexes that predominantly make up these series are sandy, gravely, and cobbly loams (NPS 2008d). The major difference between these areas is that soils occur on less steep slopes and receive more visitor traffic.

The addition of the three new trails and the extension of one trail in the Cactus Forest Planning Area have the potential to impact soils by causing additional erosion and degradation in an area that was previously not affected by hikers. Increased erosion has the potential to cause runoff from rainstorms, which may lead to sedimentation buildup in the park's streams. Soils would likely also be adversely impacted in the short term by the general construction and extension of trails. Trampling on trails can increase the rate of erosion by destroying vegetation that holds desert soils in place and displacing surface soils. Displacement and erosion is especially prevalent when horses, as opposed to hikers, use a trail because they tend to create gully-type features (Hammitt and Cole 1998). Gully erosion is a problem in recreation management because water is concentrated in channels, thus increasing its erosive power (Hammitt and

Cole 1998). It is likely that additional slight, noticeable soil loss would occur from the creation and extension of trails.

Three washes within the Cactus Forest Planning Area would also become designated trails within the park's trail system. Because these new trails would experience increased use and visitation, the newly-designated trails have the potential to have the same effects on soils as those described above.

In addition to the above-listed activities, all or parts of 10 existing trails are slated to be removed and restored to natural conditions under alternative A. This would result in an overall decrease of soil degradation and erosion in the Cactus Forest Planning Area. While soils might be adversely affected during the removal and restoration of the trail, soils would experience clearly detectible positive impacts in the long term due to the reduction in hiker and equestrian traffic. Finally, the removal of these 10 trails could potentially increase the use of other trails in the Cactus Forest Planning Area. This could result in more crowded conditions at times, causing a greater amount of soil degradation and erosion on other trails.

The recreational disturbances that are currently impacting soils would be decreased under alternative A for the Cactus Forest Planning Area. A slight, noticeable impact on soil profiles would be evident with the addition of new trails. The risk of erosion due to vegetation loss, continued trail use, and wind and water erosion would continue to impact the Cactus Forest Planning Area; however, the decreased number of trails throughout the planning area would decrease the negative impacts on soils. Overall, continued and new impacts on soils in the Cactus Forest Planning Area under alternative A would be beneficial, long-term, site-specific, and minor.

### *Foothills and Mountains Planning Area*

The Foothills and Mountains Planning Area for alternative A is the same as the no action alternative. Under alternative A, negative effects on soils due to vegetation loss, erosion, and compaction are expected to occur in the Foothills and Mountains Planning Area. Impacts on soils would likely be intensified along the Douglas Spring and Tanque Verde Ridge Trail because they occur in high-use areas. Bikes are not allowed on trails in this area, so impacts from bikes would not be observed. Since this area would not have the guidance of a formal trails plan, impacts on soils would be adverse, long-term, site-specific, and moderate.

### *Cumulative Impacts*

The same general scenario of past, present, and reasonably foreseeable future actions that apply to the no action alternative would also apply to alternative A in the RMD. Under alternative A, the overall reduction of trails in highly erodible areas would be beneficial to the soils only in localized areas. When combined with other past, present, and foreseeable future actions, cumulative impacts on soils would be adverse, long-term, site-specific, and moderate in the RMD because the effects of alternative A would only provide a small incremental beneficial impact on overall cumulative impacts.

Adding new trails and a new access point at Ernie's Falls in the Cactus Forest Planning Area, which would provide connectivity between Saguaro National Park and Coronado National Forest, together would result in more recreational opportunities, thereby increasing effects on soils as described above.

### *Conclusion*

Alternative A would continue to result in an overall degradation of soils in the majority of the RMD that is affected by recreational trails. Alternative A would decrease the number of trails in highly erodible areas within the Cactus Forest Planning Area and would increase the amount of use and access within the Southern Boundary Planning Area. Hiking, biking, and equestrian activity on the existing, extended, and new trails would continue to loosen and erode soils. Some trails within the RMD would continue to experience greater degrees of impacts depending on soil, trail characteristics, and trail use, as observed in the heavily used Cactus Forest Planning Area. The removal of trails throughout the RMD under

alternative A would ultimately reduce soil erosion and degradation in local areas; however, the removal of these trails may cause increased use on other trails. Cumulative impacts on soils would be adverse, long-term, site-specific, and moderate because the effects of alternative A would only provide a small incremental beneficial impact on overall cumulative impacts. Overall, impacts on soils under alternative A would be both beneficial and adverse, short- and long-term, site-specific, and moderate.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

### Alternative B Analysis

Alternative B would affect soils in each of the planning areas as follows:

#### *Manning Camp Planning Area*

The Manning Camp Planning Area for alternative B is the same as the no action alternative; therefore, the impacts on soils are the same as previously discussed. Impacts on soils under alternative B would be adverse, long-term, site-specific, and moderate due to the fact that any changes in soils would be immeasurable.

*Southern Boundary Planning Area including the Arizona Trail*
Under alternative B, the addition of two new trails from a new access point in the Southern Boundary Planning Area has the potential to impact soils by causing additional erosion and degradation in an area that was previously not affected by hikers. Soils would likely also be adversely impacted by the general construction of this new trail. Incorporation of sustainable design features and materials could potentially mitigate these adverse impacts. Although the creation of a new trail has the potential to adversely affect soils, it may also reduce the necessity of social trails in the Southern Boundary Planning Area because it would create continuity within the park by linking the Hope Camp Trail to the southern boundary of the Saguaro National Park. Similar to that of alternative A, the level of impact depends on factors such as soil composition, slope, trail design, climate, and trail maintenance. Additional soil loss would likely occur from the creation of these new trails.

Because the Arizona Trail would follow the alignment of the existing Tanque Verde Ridge Trail, there would be no additional effects on soils other than those discussed under the no action alternative regarding existing trails.

The same disturbances due to recreation on trails that are currently impacting soils would continue to exist under alternative B. The risk of erosion due to vegetation loss, continued trail use, and wind and water erosion processes would continue to result in a clearly detectable impact in the Southern Boundary Planning Area. Given these factors, continued and new impacts on soils would be adverse, short- and long-term, site-specific, and moderate.

#### *Cactus Forest Planning Area*

The addition of the two new trails and the extension of one trail in the Cactus Forest Planning Area would impact soils by causing additional erosion and degradation in an area that was previously not affected by hikers. Increased erosion has the potential to cause runoff from rainstorms, which may lead to sedimentation buildup in the park's streams. Soils would likely be temporarily adversely impacted by the general construction and extension of trails. Trampling on trails can increase the rate of erosion because it destroys vegetation that holds desert soils in place and displaces surface soils. This is especially prevalent when horses, as opposed to hikers, use a trail because they tend to create gully-like features (Hammitt and Cole 1998). Gully erosion is a problem in recreation management because water is concentrated in

channels, thus increasing its erosive power (Hammitt and Cole 1998). It is likely that additional slight, noticeable soil loss would occur from the creation and extension of trails.

Designation of the Javelina Wash and its tributaries as trails would likely have the same effects on soils as those described under alternative A. Because these new trails would experience increased use and visitation, the Javelina Wash would have the potential to have the same effects on soils as those listed above.

In addition to the above-listed activities, six existing trails are slated to be removed and restored to natural conditions under alternative B. This would result in an overall decrease of soil degradation and erosion in the Cactus Forest Planning Area. While soils might be adversely affected during the removal and restoration of the trail, soils would experience clearly detectible long-term positive impacts due to the reduction in hiker and equestrian traffic. Finally, the removal of these six trails could potentially increase the use of other trails in the Cactus Forest Planning Area. This could result in more crowded conditions at times, causing a greater amount of soil degradation and erosion on other trails.

The conversion of the Carillo and Garwood trails to hiker only trails would likely have beneficial effects on soil. The most noticeable effect would be the reduction in trampling of soil and vegetation as a result of eliminating heavy horse traffic on the trail (Hammitt and Cole 1998). This in turn would reduce the “gully” effect on trails, thereby decreasing the amount of soil degradation, erosion, and runoff funneling down the center of the trail.

The recreational disturbances that are currently impacting soils would be decreased under alternative B for the Cactus Forest Planning Area. A slight, noticeable impact on soil profiles would be evident with the addition of new trails. The risk of erosion due to vegetation loss, continued trail use, and wind and water erosion would continue to impact the Cactus Forest Planning Area; however, the decreased number of trails throughout the planning area would decrease the negative impacts on soils. Overall, alternative B continued and new impacts on soils in the Cactus Forest Planning Area would be beneficial, long-term, site-specific, and minor.

### *Foothills and Mountains Planning Area*

Alternative B for the Foothills and Mountains Planning Area is the same as the no action alternative. Impacts on soils would be adverse, long-term, site-specific, and moderate.

### *Cumulative Impacts*

The same general scenario of past, present, and reasonably foreseeable future actions that apply to the no action alternative would also apply to alternative B. Under this alternative, the overall reduction of trails in highly erodible areas would be beneficial to the soils only in localized areas. When combined with other past, present, and foreseeable future actions, cumulative impacts on soils would be adverse, long-term, site-specific, and moderate because the effects of alternative B would only provide a small incremental beneficial impact on cumulative impacts.

### *Conclusion*

Alternative B would continue to result in an overall degradation of soils in the majority of the RMD that is affected by recreational trails. In general, alternative B is similar to alternative A in that it decreases the number of trails within the Cactus Forest Planning Area, increases the number of trails within the Southern Boundary Planning Area, and retains the same number of trails in the other two planning areas. In total, more trails would be removed than added. The removal of trails has the potential to decrease soil erosion and degradation; however, trail removal also has the possibility of increasing soil erosion and degradation by causing increased foot, bike, and horse traffic on trails surrounding those removed. Hiking, biking, and equestrian activity on the existing, extended, and new trails would continue to loosen and erode soils within the RMD. Some trails within the RMD would continue to experience greater degrees of impacts depending on soil and trail characteristics and trail use. The removal of trails

throughout the RMD under alternative B would ultimately reduce soil erosion and degradation; however, it is unknown whether the removal of trails would cause increased use on other trails. Cumulative impacts on soils would be adverse, long-term, site-specific, and moderate because the effects of alternative B would only provide a small incremental beneficial impact on cumulative impacts. Overall, impacts on soils under alternative B would be both beneficial and adverse, short- and long-term, site-specific, and moderate.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

### Alternative C Analysis

Alternative C would affect soils in each of the planning areas as follows:

#### *Manning Camp Planning Area*

The Manning Camp Planning Area for alternative C is the same as alternative A; therefore, the impacts are the same as previously discussed in that impacts on soils would be adverse, long-term, site-specific, and negligible.

#### *Southern Boundary Planning Area including the Arizona Trail*

The trail configuration under alternative C is the same as what is described for alternative B; therefore, impacts on soils as a result of the added trails are the same as those described for alternative B. Alternative C, however, would allow bicycles on Hope Camp Trail, and The North Hope Camp Trail would be removed and restored to natural conditions. An impacts analysis regarding the effects that bicycles would have on the Hope Camp Trail is further described under alternative A.

The Arizona Trail alignment is the same as what is described for alternative A. The risk of wind and water erosion due to vegetation loss and continued trail use would continue to result in a clearly detectable impact on the Southern Boundary Planning Area, causing adverse short- and long-term site-specific moderate impacts.

#### *Cactus Forest Planning Area*

The Cactus Forest Planning Area of alternative C would add 1 new multiuse trail connecting to Old Spanish Trail road, add 1 new hiker only trail around Javelina Rocks, and add 1 new trail originating at the proposed Freeman Road access. Additionally, 9 trails would be removed from the Cactus Forest trail system. This is similar to activities under alternative A in that 3 new trails would be added and 9 rather than 10 trails would be removed. Additionally, 5 washes would be designated as trails.

As under alternative A, alternative C continued and new impacts on soils in the Cactus Forest Planning Area would be beneficial, long-term, site-specific, and minor.

#### *Foothills and Mountains Planning Area*

The Foothills and Mountains Planning Area for alternative C is the same as the no action alternative; therefore, the impacts are the same as previously discussed. Impacts on soils would be adverse, long-term, site-specific, and moderate.

#### *Cumulative Impacts*

The same general scenario of past, present, and reasonably foreseeable future actions that apply to the no action alternative would also apply to alternative C. Under alternative C, the overall reduction of trails in

highly erodible areas would be beneficial to the soils only in localized areas. When combined with other past, present, and foreseeable future actions, cumulative impacts on soils would be adverse, long-term, site-specific, and moderate because the effects of alternative C would only provide a small incremental beneficial impact on overall cumulative impacts.

Adding new trails under this alternative and the addition of a new access point at Ernie's Falls in the Cactus Forest Planning Area, which would provide connectivity between the Saguaro National Park and Coronado National Forest, together would result in more recreational opportunities, thereby increasing effects on soils as described above.

### *Conclusion*

Alternative C would continue to result in an overall degradation of soils in the majority of the RMD that is affected by recreational trails. In general, alternative C is similar to alternatives A and B in that it would decrease the number of trails within the Cactus Forest Planning Area, increase the number of trails within the Southern Boundary Planning Area, and retain the same number of trails in the other two planning areas. In total, more trails would be removed than added; however, it is uncertain as to whether the effects would be beneficial or adverse. The removal of trails has the potential to decrease soil erosion and degradation, however, trail removal also has the potential to increase soil erosion and degradation by causing increased foot, bike, and horse traffic on trails surrounding those removed. Hiking, biking, and equestrian activity on the existing, extended, and new trails would continue to loosen and erode soils within the RMD. Some trails within the RMD would continue to experience greater degrees of impacts, depending on soil and trail characteristics and trail use. The removal of trails throughout the RMD under alternative C would ultimately reduce soil erosion and degradation; however, the removal of trails may cause increased use on other trails. Cumulative impacts on soils would be adverse, long-term, site-specific, and moderate because the effects of alternative C would only provide a small incremental beneficial impact on overall cumulative impacts. Overall impacts under alternative C would be both beneficial and adverse, short- and long-term, site-specific, and minor.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Preferred Alternative Analysis

The preferred alternative would affect soils in each of the planning areas as follows:

### *Manning Camp Planning Area*

The Manning Camp Planning Area for the preferred alternative is the same as the no action alternative; therefore, the impacts are the same as previously discussed in that impacts on soils would be adverse, long-term, site-specific, and moderate.

### *Southern Boundary Planning Area*

The Southern Boundary Planning Area for the preferred alternative is the same as alternative C. The impacts are the same as previously discussed in alternative C and would be adverse, short- and long-term, site-specific, and moderate.

### *Cactus Forest Planning Area*

The Cactus Forest Planning Area for the preferred alternative would add one new hiker only trail around Javelina Rocks, add a horse and hiker trail at Ernie's Falls, extend the Lime Falls Trail that spurs off of the Cactus Forest Trail, convert the Wentworth Trail between Garwood and Douglas Springs to a hiker

only trail, and consider the Mica View Trail from the Broadway trailhead to the Mica View Picnic Area for an ADA challenge trail. Horses would not be permitted on this trail but would be able to access the picnic area from the Cactus Forest Trail. Additionally, seven trails would be removed from the Cactus Forest trail system. These trails include all or portions of: Palo Verde, Bajada Vista, Wentworth, Kennedy, Freight Wagon, Loma Verde and Saguaro. This is similar to activities under alternative B in that two new trails, rather than three, would be added; one trail would be extended, and seven trails, rather than six, would be removed.

The disturbances from recreational uses that are currently impacting soils would most likely be decreased under the preferred alternative. This is because some of the worst trails for soil erosion (east part of Bajada Vista, south end of Kennedy) would be closed. The risk of erosion as a result of vegetation loss and continued trail use would continue to impact the Cactus Forest Planning Area; however, the decreased number of trails and designation of one trail as a hiking trail would likely decrease the negative effects on soils. Given these factors, the preferred alternative has the potential to benefit soils in the Cactus Forest Planning Area. The preferred alternative would create beneficial long-term site-specific moderate impacts on soils.

### *Foothills and Mountains Planning Area*

The Foothills and Mountains Planning Area for the preferred alternative is the same as the no action alternative; therefore, the impacts are the same as previously discussed. Impacts on soils would be adverse, long-term, site-specific, and moderate.

### *Cumulative Impacts*

The cumulative impacts for the preferred alternative would be similar to the no action alternative. As under the no action alternative, preferred alternative cumulative impacts on soils would be adverse, long-term, site-specific, and moderate. When combined with other past, present, and foreseeable future actions, the preferred alternative would provide a small incremental beneficial impact on overall cumulative impacts.

### *Conclusion*

The preferred alternative would continue to result in an overall degradation of soils in the majority of the RMD that is affected by recreational trails. In general, the preferred alternative is a compilation of the different beneficial aspects analyzed in alternatives A, B, and C in that it decreases the number of trails within the Cactus Forest Planning Area, increases the number of trails within the Southern Boundary Planning Area, retains the same number of trails in the other two planning areas, and still accomplishes project goals. The removal of trails has the potential to decrease soil erosion and degradation, however, trail removal also has the possibility to increase soil erosion and degradation by causing increased foot, bike, and horse traffic on trails surrounding those removed. Hiking, biking, and equestrian activity on the existing, extended, and new trails would continue to loosen and erode soils within the RMD. Some trails within the RMD would continue to experience greater degrees of impacts depending on soil and trail characteristics and trail use. The overall trails plan for the RMD under the preferred alternative is expected to ultimately reduce soil erosion and degradation and improve trail planning and maintenance. Cumulative impacts on soils would be adverse, long-term, site-specific, and moderate. Overall impacts on soils as a result of the preferred alternative would be beneficial and adverse, short- and long-term, site-specific, and minor.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Tucson Mountain District

### Alternative A Analysis

Alternative A would affect soils in each of the planning areas as follows:

#### *Northeast Corner Planning Area*

Soils in the Northeast Corner Planning Area consist of 1% to 55% slopes and are predominantly from the Anklam, Pantano, Pinaleno, and Tubac soil series. These soils series have similar properties to the RMD soils in that they consist primarily of sandy and gravelly loams with slight to severe erosion potential and have severe revegetation limitations due to erosion (NPS 2008).

The conversion of a social trail to a formal interior loop trail in the Northeast Corner Planning Area has the potential to negatively impact soils. Low recreational use of trails causes the most change in soils with further use causing less additional impact (Hammitt and Cole 1998). This effect is intensified in soils that have varying particle sizes, such as the loams in the Northeast Corner Planning Area.

Under alternative A, this trail would be recognized by the NPS; therefore, it would be subject to a trail maintenance plan which would account for design standards, mitigation measures, and other resources necessary to maintain a viable trail system. Adding an access point and trailhead would reduce the chance that hikers would trample vegetation and other sensitive resources to get to the trail.

The removal and restoration of all other social trails in the Northeast Corner Planning Area is likely to benefit soils. Local vegetation loss, soil degradation, and erosion would all be reduced if social trails were restored to their natural conditions. Additionally, the reduction in erosion could potentially reduce the amount of sediment that enters the headwaters of some of the park's streams. Finally, the removal of the social trails would increase the use of official trails. This could result in more crowded conditions, but this would be more likely beneficial than adverse since users would be concentrated in a specific area, reducing the creation of social trails throughout the planning area.

Relocation of the Ringtail Trail crossing from the Box Canyon parking lot across Picture Rocks Road would more or less have neutral effects on soil resources. Moving the trail crossing would initially have a negative effect on soils since damaged vegetation would cause soil degradation and erosion in an area with which humans have not previously been in contact. However, the original Ringtail Trail crossing would be restored to its natural conditions.

The disturbances from recreation that are currently impacting soils would most likely be decreased under alternative A. The risk of erosion due to vegetation loss, continued trail use, and wind and water erosion would continue to impact the Northeast Corner Planning Area; however, the decreased number of social trails would likely decrease the negative effects on soils. Use would be concentrated to a few specific trails which would likely result in some degradation of soils, but less than would otherwise be observed if several social trails remained in the planning area. Based on this information, alternative A would be beneficial, long-term, site-specific, and minor because soils would be slightly altered in a way that is noticeable.

#### *Northwest Planning Area*

Soils in the Northwest Planning Area consist of 1% to 55% slopes and are predominantly comprised of Anklam, Hayhook, Pantano, and Pinaleno soil series. These soils are similar to those in the Northeast Corner Planning Area in that they consist primarily of sandy and gravelly loams with slight to severe erosion potential and have severe limitations for revegetation because of the risk of erosion (NPS 2008).

The addition of two new trails has the potential to impact soils by causing additional soil disturbance and compaction in an area that was previously not affected by hikers. Increased erosion caused by runoff during rainstorms and high winds may lead to sedimentation buildup in the park's streams. Soils would likely be adversely impacted by the general construction and extension of trails. Incorporation of

sustainable design features and materials would mitigate the impacts from alternative A on the Northwest Planning Area. Additional localized soil loss would likely occur from the creation of these trails.

Conversion of the Golden Gate Road to a multiuse trail would eliminate motor vehicle access and subsequently beneficially impact soils and reduce erosion of soils on this trail. Multiuse trails have the potential to reduce impacts on soils by redistributing soils across the trail (NPS 2002a). Soils may be loosened from the sides of the trail and redistributed into the center of the trail by horses and hikers (NPS 2002a). The level of impact depends on factors such as soil composition, slope, trail design, trail maintenance, and climate (Weaver and Dale 1978). Slight soil loss would continue from the added visitation resulting from two new access points. The elimination of motor vehicles on the Golden Gate Road would likely benefit soils since compaction from heavy vehicles would likely subside, and dust would decrease.

The impacts associated with the removal and restoration of social trails adjacent to the Sandario Road in the Northwest Planning Area would likely be beneficial to soils and are the same as those described in the Northeast Corner Planning Area of the alternative A analysis.

The disturbances from recreational use that are currently impacting soils would most likely be decreased under alternative A. The risk of erosion due to vegetation loss, continued trail use, and wind and water erosion would continue to impact the Northeast Corner Planning Area. Given these factors, impacts on soils would be adverse, long-term, site-specific, and minor since soil resources would be slightly altered in a noticeable way.

### *South Central Planning Area*

As described in chapter 3, soils in the South Central Planning Area consist of 1% to 60% slopes comprised of Anklam, Chimenea, Hayhook, Palos Verdes, Pantano, Pinaleno, and Saguaro soils. These soils have similar properties as those in the other three planning areas in that the majority of the complexes are made up of sandy or gravelly loams (NPS 2008).

Conversion of the Golden Gate Road to a multiuse trail would eliminate motor vehicle access and subsequently beneficially impact soils and reduce erosion of soils on this trail. Multiuse trails have the potential to reduce impacts on soils by redistributing soils across the trail (NPS 2002a). Soils may be loosened from the sides of the trail and redistributed into the center of the trail by horses and hikers (NPS 2002a). The level of impact depends on factors such as soil composition, slope, trail design, trail maintenance, and climate (Weaver and Dale 1978). Slight soil loss would continue from the added visitation resulting from two new access points. The elimination of motor vehicles on the Golden Gate Road would likely benefit soils since compaction from heavy vehicles would likely subside, and dust would decrease.

The impacts associated with the removal and restoration of the Wild Dog Trail just west of Apache Peak in the South Central Planning Area would have a long-term beneficial impact on soils. The removal of the trail and the restoration to natural conditions would decrease the risk of soil degradation and erosion. While soils might be temporarily adversely affected during the removal and restoration of the trail, soils would be beneficially impacted in the long term due to a reduction in foot traffic. The clearly detectible reduction in erosion could potentially reduce the amount of sediment that enters the headwaters of some of the park’s streams. Creating connectivity between two trails by creating loops would lead to more use on trails that were originally out-and-back trails. This would slightly impact soils in that greater use would lead to more erosion and compaction.

The disturbances due to recreational activities that are currently impacting soils would most likely be decreased under alternative A. The risk of erosion due to vegetation loss, continued trail use, and wind and water erosion would continue to impact the Southwest Central Planning Area. The removal of the Wild Dog Trail may help to lessen some of these effects. As in the Northwest Planning Area, alternative A has the potential to benefit soils in the South Central Planning Area. Impacts on soils would be

beneficial, long-term, site-specific, and moderate because soils would be obviously altered in some areas, and there is a reduced potential for erosion.

### *East Boundary Planning Area*

Soils in the East Boundary Planning Area consist of 1% to 60% slopes and are predominantly comprised of Anklam, Pantano, Pinaleno, and Tubac soil series. These soils are similar to those described in the Northeast Corner and Northwest planning areas in that they consist primarily of sandy and gravelly loams with slight to severe erosion potential and have severe limitations for revegetation because of the risk of erosion (NPS 2008).

The impacts associated with the conversion of the network of social trails that are accessed by the Veteran's access point, the Pipeline, and Abbington Roads are similar to those described in the Northeast Corner Planning Area of the alternative A analysis in that these trails would now be recognized by the NPS and would therefore be subject to design standards and a trail maintenance plan. These factors would likely benefit soils.

The impacts associated with the removal and restoration of all other social trails and old roads in the East Boundary Planning Area is similar to those described in the Northeast Corner Planning Area of alternative A analysis because vegetation loss, soil degradation, and erosion would be reduced as trails are restored to natural conditions. The removal of the social trails would increase the use of official trails. This could result in more crowded conditions, but this would likely be more beneficial than adverse since users would be concentrated in a specific area, reducing the creation of social trails throughout the planning area.

The environmental disturbances that are currently impacting soils would be decreased under alternative A. The risk of erosion due to vegetation loss, continued trail use, and wind and water erosion would continue to impact the East Boundary Planning Area; however, the decreased number of social trails would likely decrease the negative effects on soils. Use would be concentrated in a few specific trails, and this would likely result in some degradation of soils, but less than would otherwise be observed if several social trails remained in the planning area. Based on this information, alternative A would be beneficial, long-term, site-specific, and minor because soils would be slightly altered in a way that is noticeable.

### *Cumulative Impacts*

The same general scenario of past, present, and reasonably foreseeable future actions that apply to the no action alternative would also apply to alternative A. The overall reduction of social trails in highly erodible areas would be beneficial to the soils only in localized areas. When combined with other past, present, and foreseeable future actions, cumulative impacts on soils would be adverse, long-term, site-specific, and minor because the beneficial effects of alternative A would provide only a small incremental impact to overall cumulative impacts.

In the Northeast Corner Planning Area, recent development, combined with new access into the park and new recreational opportunities (providing a new loop trail and two new access points), would increase visitor use in an area that currently has no official trails, thereby increasing impacts on soils. Similarly, providing a new trail to Panther and Safford Peaks in the Northwest Planning Area, as well as providing new trail opportunities in the South Central and Eastern Boundary planning areas, would combine with the effects of increased development to help distribute visitor use.

### *Conclusion*

Alternative A would continue to result in an overall degradation of soils in the majority of the TMD that is affected by recreational trails. Alternative A adds one formal trail and decreases the number of social trails within the Northeast Corner Planning Area, adds two formal trails and decreases the number of social trails within the Northwest Planning Area, increases the number of trails in the South Central

Planning Area, converts Golden Gate Road to a multiuse trail and more or less adds and removes the same number of social trails in the East Boundary Planning Area. Hiking, biking on Golden Gate Road, and equestrian activity on the existing and new trails would continue to loosen and erode soils within the TMD. Some trails would continue to experience greater degrees of impacts depending on soil and trail characteristics and trail use. The removal of several social trails throughout the TMD under alternative A would ultimately reduce soil erosion and degradation; however, it is unknown whether the removal of trails would cause increased use on other trails. Cumulative impacts on soils would be adverse, long-term, site-specific, and minor because the beneficial effects of alternative A would provide only a small incremental impact to overall cumulative impacts. Overall, alternative A would be both beneficial and adverse, short- and long-term, site-specific, and minor since soils would be obviously altered, and the potential for erosion to remove small quantities of soil would increase.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Alternative B Analysis

Alternative B would affect soils in each of the planning areas as follows:

### *Northeast Corner Planning Area*

The conversion of three social trails to a formal interior loop trail in the Northeast Corner Planning Area has the potential to negatively impact soils. Low recreational use of trails causes the most change in soils with further use causing fewer additional impacts (Hammitt and Cole 1998). This effect is intensified in soils that have varying particle sizes, such as the loams in the Northeast Corner Planning Area.

Under alternative B, these three trails would be recognized by the NPS; therefore, the area would be subject to a trail maintenance plan which would account for design standards, mitigation measures, and other resources necessary to maintain a viable trail system. Adding an access point and trailhead for this trail would reduce the chance that hikers would trample vegetation and other sensitive resources to get to the trail.

The removal and restoration of all other social trails in the Northeast Corner Planning Area is likely to benefit soils. Local vegetation loss, soil degradation, and erosion would all be reduced if social trails were restored to their natural conditions. Additionally, the reduction in erosion could potentially reduce the amount of sediment that enters the headwaters of some of the park's streams. Finally, the removal of the social trails would increase the use of official trails. This could result in more crowded conditions, but this would be more likely beneficial than adverse in that users would be concentrated in a specific area, reducing the creation of social trails throughout the planning area.

Relocation of the Ringtail Trail crossing from the Box Canyon parking lot across Picture Rocks Road would more or less have neutral effects on soil resources. Moving the trail crossing would initially have a negative affect on soils in that it would damage vegetation and cause soil degradation and erosion in an area that humans have not previously been in contact with. However, the original Ringtail Trail crossing would be restored to its natural conditions.

The disturbances from recreation that are currently impacting soils would most likely be decreased under alternative B. The risk of erosion due to vegetation loss, continued trail use, and wind and water erosion would continue to impact the Northeast Corner Planning Area; however, the decreased number of social trails would likely decrease the negative effects on soils. Use would be concentrated in a few specific trails, and this would likely result in some degradation of soils, but less than would otherwise be observed

if several social trails remained in the planning area. Based on this information, alternative B would be beneficial, long-term, site-specific, and minor because soils would be slightly altered in a way that is noticeable.

### *Northwest Planning Area*

Detectable impacts on soils as a result of the additional equestrian trail to the west of the historic CCC camp is possible due to an increase in the trampling of vegetation and loosening of soils resulting from horses on the trails, thereby increasing the amount of soil degradation, erosion, and vegetation loss (Hammitt and Cole 1998).

Conversion of the Golden Gate Road to a multiuse trail would eliminate motor vehicle access and subsequently beneficially impact soils and reduce erosion of soils on this trail. Multiuse trails have the potential to reduce impacts on soils by redistributing soils across the trail (NPS 2002a). Soils may be loosened from the sides of the trail and redistributed into the center of the trail by horses and hikers (NPS 2002a). The level of impact depends on factors such as soil composition, slope, trail design, trail maintenance, and climate (Weaver and Dale 1978). Slight soil loss would continue from the added visitation resulting from two new access points. The elimination of motor vehicles on the Golden Gate Road would likely benefit soils in that compaction from heavy vehicles would likely subside, and dust would decrease.

The impacts associated with the removal and restoration of social trails adjacent to the Sandario Road in the Northwest Planning Area would likely be beneficial to soils and are similar to those described in the Northeast Corner Planning Area of the alternative A analysis.

The risk of erosion due to vegetation loss, continued trail use, and wind and water erosion would continue to impact the Northeast Corner Planning Area; however, the decreased number of social trails and motor vehicle traffic on Golden Gate Road would decrease the negative effects on soils. Impacts on soils would be adverse, long-term, site-specific, and minor due to soils being slightly altered in a noticeable way.

### *South Central Planning Area*

The South Central Planning Area of alternative B would create a connection between Picture Rocks Wash and Prophecy Wash and would add a trail extending from the Red Hills Visitor Center to the southwestern boundary of the TMD.

Creating connectivity between two trails by creating loops would lead to more use on trails that were originally out-and-back trails. This would slightly impact soils in that greater use would lead to more erosion and compaction.

The disturbances due to recreational activities that are currently impacting soils would most likely be decreased under alternative B. The risk of erosion due to vegetation loss, continued trail use, and wind and water erosion would continue to impact the South Central Planning Area. As in the Northwest Planning Area, alternative B has the potential to benefit soils in the South Central Planning Area, and impacts on soils would be beneficial, long-term, site-specific, and moderate because soils would be obviously altered in some areas, and there is a reduced potential for erosion.

### *East Boundary Planning Area*

Changes would be similar to alternative A, but additional trails and access points would be added.

The impacts associated with the conversion of the network of social trails that are accessed by the Old Yuma access point, the Pipeline, and Abbington Roads is similar to those described in the Northeast Corner Planning Area of the alternative A analysis in that these trails would now be recognized by the NPS and would therefore be subject to design standards and a trail maintenance plan. These factors would likely benefit soils.

The impacts associated with the removal and restoration of all other social trails and old roads in the East Boundary Planning Area is similar to those described in the Northeast Corner Planning Area of the alternative A analysis because vegetation loss, soil degredation, and erosion would be reduced as trails are restored to natural conditions. The removal of the social trails would increase the use of official trails. This could result in more crowded conditions, but this would be more likely beneficial than adverse in that users would be concentrated in a specific area, reducing the creation of social trails throughout the planning area.

The disturbances from recreational activities that are currently impacting soils would be decreased under alternative B. The risk of wind and water erosion due to vegetation loss, continued trail use, and wind and water erosion would continue to impact the East Boundary Planning Area; however, the decreased number of social trails would likely decrease the negative effects on soils. Use would be concentrated in a few specific trails, and this would likely result in some degradation of soils, but less than would otherwise be observed if several social trails remained in the planning area. Based on this information, alternative B would be beneficial, long-term, site-specific, and minor because soils would be slightly altered in a way that is noticeable.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to this alternative with some differences in certain areas. Most of the differences compared to alternative A would be so slight as to result in no measurable change to cumulative impacts (e.g., providing three new trail loops in the Northeast Corner Planning Area instead of one). Combining increased access and new trail opportunities with increasing development would be a beneficial regional long-term minor impact on visitor use and experience.

The overall reduction of social trails in highly erodible areas would be beneficial to the soils only in localized areas. Compared to the cumulative impacts expected under the no action alternative, these differences would be so small in relation to the past, present, and future effects of encroaching development as to result in no measurable difference. Cumulative impacts would be adverse, site-specific, long-term, and minor. This alternative would provide a small incremental impact to overall cumulative impacts.

### *Conclusion*

Alternative B would continue to result in an overall degradation of soils in the majority of the TMD that is affected by recreational trails. Overall, alternative B adds three formal trails and decreases the number of social trails within the Northeast Corner Planning Area, adds two formal trails and decreases the number of social trails within the Northwest Planning Area, increases the number of trails in the South Central Planning Area, and more or less adds and removes the same number of social trails in the East Boundary Planning Area. Hiking and equestrian activity on the existing and new trails would continue to loosen and erode soils within the TMD. Some trails within the TMD would continue to experience greater degrees of impacts, depending on soil and trail characteristics and trail use. The removal of several social trails throughout the TMD under alternative B would ultimately reduce soil erosion and degradation; however, it is unknown whether the removal of trails would cause increased use on other trails. Cumulative impacts would be adverse, site-specific, long-term, and minor. Overall, impacts on the TMD under alternative B would be beneficial and adverse, short- and long-term, site-specific, and minor.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Preferred Alternative Analysis

The preferred alternative would affect soils in each of the planning areas as follows:

### *Northeast Corner Planning Area*

Under the preferred alternative, two loop trails with two spurs would be formalized in the Northeast Corner Planning Area. Low recreational use of trails causes the most change in soils with further use causing less additional impact (Hammitt and Cole 1998). This effect is intensified in soils that have varying particle sizes, such as the loams in the Northeast Corner Planning Area.

Under the preferred alternative, these new trails would be recognized by the NPS; therefore, the area would be subject to a trail maintenance plan which would account for design standards, mitigation measures, and other resources necessary to maintain a viable trail system.

The removal and restoration of all other social trails in the Northeast Corner Planning Area is likely to benefit soils. Local vegetation loss, soil degradation, and erosion would all be reduced if social trails were restored to their natural conditions. Additionally, the reduction in erosion could reduce the amount of sediment that enters the headwaters of some of the park's streams. Finally, the removal of social trails would increase the use of official trails. This could result in more crowded conditions, but this would be more likely beneficial than adverse in that users would be concentrated in a specific area, reducing the creation of social trails throughout the planning area.

The disturbances from recreation that are currently impacting soils would most likely be decreased under the preferred alternative. The risk of erosion due to vegetation loss, continued trail use, and wind and water erosion would continue to impact the Northeast Corner Planning Area; however, the decreased number of social trails would likely decrease the negative effects on soils. Use would be concentrated in a few specific trails, and this would likely result in some degradation of soils, but less than would otherwise be observed if several social trails remained in the planning area. Based on this information, the preferred alternative would be beneficial, long-term, site-specific, and minor because soils would be slightly altered in a way that is noticeable.

### *Northwest Planning Area*

The Northwest Planning Area for the preferred alternative is the same as alternative B, except that the new trail to Panther and Safford Peaks would be hiker only. This would reduce the impacts on soils compared to having horses on the trail, which would be quite steep and rocky. Impacts on soils would be adverse, long-term, site-specific, and minor.

### *South Central Planning Area*

The impacts on soil associated with creating a connection between Picture Rocks Wash and Prophecy Wash and creating a connection between the Bajada Wash and Dobe Wash trails are consistent with those described in the alternative A discussion. Creating connectivity between the two trails by creating loops would lead to more use on trails that were originally out-and-back trails. This would slightly impact soils in that greater use would lead to more erosion and greater compaction.

The conversion of the Cactus Wren and Manville trails from hiker only use to hiker/equestrian use would likely have some adverse effects on soil. Additionally, detectable impacts on soils as a result of the additional equestrian trail along the north of Signal Hill would be evident under the preferred alternative. The most noticeable effect would be the increase in the trampling of vegetation and loosening of soils resulting from heavy horses on the trails, thereby increasing the amount of soil degradation, erosion, and vegetation loss (Hammitt and Cole 2008).

The disturbances due to recreational activities that are currently impacting soils would most likely be decreased under the preferred alternative. The risk of erosion due to vegetation loss, continued trail use, and wind and water erosion would continue to impact the South Central Planning Area. The removal of

horses from the Wild Dog Trail may help to lessen some of these effects. As in the Northwest Planning Area, the preferred alternative has the potential to benefit soils in the South Central Planning Area, and impacts on soils would be beneficial, long-term, site-specific, and moderate because soils would be obviously altered in some areas, and there is a greater potential for erosion to remove small quantities of additional soil.

### *East Boundary Planning Area*

Under the preferred alternative, a network of social trails would be formalized in the East Boundary Planning Area. The impacts associated with the conversion of these social trails is similar to those described in the Northeast Corner Planning Area of the alternative A analysis in that these trails would now be recognized by the NPS and would therefore be subject to design standards and a trail maintenance plan. These factors would likely benefit soils. An additional noticeable benefit would occur from the restoration of social trails that link the park to private lands. Restoring these trails would reduce the negative effects of erosion and compaction.

Opening the Belmont Trail to hikers, bikers, and equestrians has the potential to benefit soils and reduce erosion. Multiuse trails may decrease negative impacts on soils by redistributing soils across the trail (NPS 2002a). Soils affected by “cupping” or “gullying” that occurs as a result of use directly down the center of the trail may be loosened from the sides of the trail and redistributed into the center by hikers and horses (Hammitt and Cole 1998). The level of impact depends on factors such as soil composition, slope, trail design, trail maintenance, and climate (Weaver and Dale 1978). Slight soil loss would continue from the added visitation resulting from three new access points.

The impacts associated with the removal and restoration of all other social trails and old roads in the East Boundary Planning Area is similar to those described in the Northeast Corner Planning Area of the alternative A analysis because vegetation loss, soil degredation, and erosion would be reduced as trails are restored to natural conditions. The removal of the social trails would increase the use of official trails. This could result in more crowded conditions, but this would more likely be beneficial than adverse in that users would be concentrated in a specific area, reducing the creation of social trails throughout the planning area.

The disturbances from recreational activities that are currently impacting soils would be decreased under the preferred alternative. The risk of wind and water erosion due to vegetation loss and continued trail use would continue to impact the East Boundary Planning Area; however, the decreased number of social trails would likely decrease the negative effects on soils. Use would be concentrated in a few specific trails, and this would likely result in some degradation of soils, but less than would otherwise be observed if several social trails remained in the planning area. Based on this information, the preferred alternative impacts would be beneficial, long-term, site-specific, and minor because soils would be slightly altered in a way that is noticeable.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to this alternative with some differences in certain areas. Most of the differences compared to alternative A would be so slight as to result in no measurable change to cumulative impacts (e.g., providing two new trail loops in the Northeast Corner Planning Area instead of one).

The overall reduction of social trails in highly erodible areas would be beneficial to soils only in localized areas. Compared to the cumulative impacts expected under the no action alternative, these differences would be so small in relation to the past, present, and foreseeable future effects of increased park use as to result in no measureable difference. Cumulative impacts would be adverse, site-specific, long-term, and minor. This alternative would provide a small incremental impact to overall cumulative impacts.

### *Conclusion*

The preferred alternative would continue to result in an overall degradation of soils in the majority of the TMD that is affected by recreational trails. In general, the preferred alternative is a compilation of the different beneficial aspects analyzed in alternatives A and B in that it increases the number of formal trails and decreases the number of social trails within the Northeast Corner Planning Area, increases the number of formal trails and decreases the number of social trails within the Northwest Planning Area, increases the number of trails in the South Central Planning Area, and retains the same number of social trails in the East Boundary Planning Area. The removal of trails has the potential to decrease soil erosion and degradation; however, trail removal also has the possibility to increase soil erosion and degradation by causing increased foot, bike, and horse traffic on trails surrounding those removed. Hiking, biking, and equestrian activity on the existing, extended, and new trails would continue to loosen and erode soils within the TMD. Some trails within the TMD would continue to experience greater degrees of impacts, depending on soil and trail characteristics and trail use. The overall trails plan for the TMD under the preferred alternative is expected to ultimately reduce soil erosion and degradation and improve trail planning and maintenance. Cumulative impacts would be adverse, site-specific, long-term, and minor. This alternative would provide a small incremental impact to overall cumulative impacts. Based on this information, the preferred alternative would be beneficial and adverse, long-term, site-specific, and minor.

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 or proclamation of Saguaro National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## *Cultural Resources*

### Methodology

Information about historic structure and archeological cultural 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 cultural resources specialists, data from park records, and studies of similar actions and effects, when applicable. Certain important research questions about human history can only be answered by the actual physical material of cultural resources. Historic structures and archeological resources have the potential to answer, in whole or in part, such research questions. An archeological site(s) or historic structure can be eligible to be listed in the National Register of Historic Places (NRHP) if the site(s) has yielded, or may be likely to yield, information important in prehistory or history. Potential impacts on historic properties (any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP maintained by the secretary of the interior) were identified and evaluated in accordance with the Advisory Council on Historic Preservation's (ACHP) regulations implementing Section 106 of the *National Historic Preservation Act* (NHPA) (16 U.S.C. 470 *et seq*., as amended through 2000) and implementing regulations 36 CFR 800 (Protection of Historic Properties). This process involves the following steps:

- Determine the area of potential effects (APE) (36 CFR 800.4(a)).
- Identify historic properties in the APE (36 CFR 800.4(b)).
- Evaluate historic significance (36 CFR 800.4(c)).
- Apply the criteria of adverse effect to affected properties (36 CFR 800.5).
- Resolve adverse effects (36 CFR 800.6).

## Intensity Thresholds

For purposes of analyzing impacts on historic structures and archeological resources, thresholds of change for the intensity of an impact are based upon the potential of the site(s) to yield information important in prehistory or history as well as the probable historic context of the affected site(s). Within this analysis, impacts on historic structures and archeological resources in the park were assessed and proposed actions were rated using type and intensity criteria.

***Type*** determination included the following criteria:

- Effect (beneficial, adverse, or no discernable effect)
- Context (site-specific, local, or regional)
- Duration (short-term, lasting less than one year; or long-term, lasting more than one year). All impacts on historic structures and archeological resources are assumed to be long-term.

***Intensity*** thresholds of an impact on historic structures and archeological resources range from negligible to major and can be positive or negative. These thresholds are briefly described below.

*Negligible:* The effect on historic structures and/or archeological resources would be at the lowest levels of detection, barely perceptible, and not measurable.

*Minor:* The effect on historic structures and/or archeological resources would be measurable or perceptible, but slight. A limited area of a site or group of sites would be affected. The impact would not affect the character defining features of NRHP eligible or listed properties and would not have a permanent effect on the integrity of any historic structures and/or archeological resources.

*Moderate:* The effect would be measurable and perceptible. The impact would change one or more character defining feature(s) of historic structures and archeological resources but would not diminish the integrity of the resource(s) to the extent that NRHP eligibility would be jeopardized.

*Major:* The effect on historic structures and archeological resources would be substantial, noticeable, and permanent. The impact would be severe or of exceptional benefit. For National Register eligible or listed historic structures and/or archeological resources, the impact would change one or more character-defining features(s) of the resource, diminishing the integrity of the resource to the extent that it would be no longer eligible for listing in the NRHP.

### Alternatives

Cultural resources would be considered during all phases of planning for the comprehensive trails plan. Many of the current trails in the park pass through or near historic and archeological sites. The greatest risk to these sites is ground-disturbing activities, such as those associated with trail construction, maintenance, or closure. Although none of the alternatives propose construction of new trails on or adjacent to known cultural resources, Section 106 compliance would be completed on a project-by-project basis, especially for maintenance and closure projects.

## No Action Alternative

The no action alternative represents current conditions and is also a baseline for comparison of the action alternatives. Under this alternative, the park would continue to manage trails without a comprehensive plan for a balanced and sustainable trail system. No new trails would be designed and constructed, and trails in both units would not be evaluated for sustainable condition and suitability. Social trails would not be converted to official trails, and a majority of them would eventually be closed and restored. Some reroutes may occur under a categorical exclusion; however, unsustainable trails in poor condition may eventually be closed without a suitability analysis to determine how they contribute to the overall trail system.

Historic structures and archeological resources adjacent to or easily accessible to visitors from trails 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 distributions, or a reduction of contextual evidence; this would constitute adverse local long-term moderate impacts on archeological resources. This problem could be offset by continued ranger patrolling and emphasis on visitor education.

### Rincon Mountain District

The current trails configuration in the RMD would remain. Existing social trails would not be evaluated for suitability for inclusion in the trail system and would eventually be closed. All unauthorized social trails would eventually be closed due to resource damage. Comprehensive guidance for trail design and mitigation would not be developed. In addition, many trails and trailheads in need of signs would remain unmarked. Archeological resources easily accessible to visitors from trails 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 distributions, or a reduction of contextual evidence; this would constitute adverse local long-term moderate impacts on archeological resources.

#### *Cumulative Impacts*

The past, present, and reasonable foreseeable future actions with potential to affect cultural resources are related primarily to encroaching development around the park. As a result of this development, the park has erected a boundary fence to help prevent, among other things, illegal off-road use. Park staff would be limited in their ability to patrol all areas; however, and looting and vandalism would continue. With few or no signs, visitors could not be educated on the importance of cultural resources in the park. Social trails might proliferate and adversely affect archeological and historic resources. Impacts of encroaching development would be overall adverse, local, long-term, and moderate. The no action alternative would provide a small incremental impact to the overall cumulative impacts.

#### *Conclusion*

Overall, adverse impacts on cultural resources would continue to occur from visitor use and would be adverse, localized, long-term, and negligible to minor in intensity. Impacts associated with the current and future recreational use of the Cactus Forest Trail are expected to contribute to a negligible amount of cultural resources loss when considered with other past, present, and reasonably foreseeable future actions.

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 or proclamation of the park; (2) key to the cultural integrity of the park; or (3) identified as a goal in the park’s GMP or other relevant NPS planning documents, there would be no impairment of the park’s resources or values. There would also be no unacceptable impacts as defined in the “Unacceptable Impacts” section of this chapter.

### Tucson Mountain District

The current configuration of formal trails in the TMD would remain, and existing social trails would not be evaluated for suitability for inclusion in the trail system and would eventually be closed. Comprehensive guidance for trail design and mitigation would not be developed. All unauthorized social trails would eventually be closed due to resource damage. Off-trail travel restrictions would continue to apply under 4,500 feet. A boundary fence around this district would help prevent illegal off-road travel into the park. Archeological resources easily accessible to visitors from trails 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 distributions, or a

reduction of contextual evidence; this would constitute adverse local long-term moderate impacts on archeological resources.

*Cumulative Impacts*

The same general scenario of past, present, and reasonably foreseeable future actions that apply to the RMD would also apply to the TMD. Social trails may proliferate and adversely affect archeological and historic resources. With few or no signs, visitors could not be educated on the importance of cultural resources in the park. Impacts of encroaching development would be overall adverse, local, long-term, and moderate. The no action alternative would provide a small incremental impact to the overall cumulative impacts.

*Conclusion*

Overall, adverse impacts on cultural resources would continue to occur from visitor use, and would be localized, long-term, and negligible to minor in intensity. Impacts associated with the current and future recreational use of the King Canyon Trail is expected to contribute to a negligible amount of cultural resources loss when considered with other past, present, and reasonably foreseeable future actions. Comprehensive guidance for trail design and mitigation would not be developed. In addition, many trails and trailheads in need of signs would remain unmarked. Archeological resources easily accessible to visitors from trails 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 distributions, or a reduction of contextual evidence; this would constitute adverse local long-term moderate impacts on archeological resources.

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 or proclamation of the park; (2) key to the cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Rincon Mountain District

### Alternative A Analysis

This alternative focuses on providing reasonable access and a variety of trail recreational experiences while minimizing redundancy in some high density areas. Both existing and new trails were evaluated in terms of access to attraction sites, variety in terrain, vegetation type, user type, popularity, and safe travel as well as resource protection and sustainability. Some trails in high density areas were eliminated if they did not meet these criteria. Links to USFS lands have been included to ensure continuity of appropriate trail recreation on neighboring lands.

Historic structures and archeological resources adjacent to or easily accessible to visitors from trails 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 distributions, or a reduction of contextual evidence; this would constitute adverse effects on archeological resources. This problem could be offset by continued ranger patrolling and emphasis on visitor education. Section 106 compliance would precede any ground disturbance associated with excavation or construction, including trail maintenance, the closure and revegetation of social trails, and the construction of new trails and trailhead parking areas. NRHP-listed or eligible 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 (SHPO) and the traditionally associated tribes.

NRHP-listed or eligible historic structures would be maintained on a daily, cyclical, and seasonal basis. Some structures would be stabilized, preserved, or rehabilitated.

The same general scenario of past, present, and reasonably foreseeable future actions that apply to the no action alternative would also apply to alternative A. The RMD contains four distinct planning areas: Manning Camp, Southern Boundary, Cactus Forest, and Foothills and Mountains. Alternative A would affect cultural resources in each of the planning areas where new trails are added or existing trails are proposed to be extended or converted to multiple use. This drawback is partially offset by the removal of and restoration to natural conditions of 10 trails. Overall, impacts would be adverse, site-specific, long-term, and negligible to minor.

### *Cumulative Impacts*

The same general scenario of past, present, and reasonably foreseeable future actions that apply to the no action alternative would also apply to alternative A. This alternative would also increase access to hitherto remote areas containing cultural resources. Impacts of encroaching development, in addition to increased access to cultural resources, would be overall adverse, local, long-term, and moderate. Alternative A would provide a small incremental impact to the overall cumulative impacts.

### *Conclusion*

Historic structures and archeological resources adjacent to or easily accessible to visitors from trails 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 distributions, or a reduction of contextual evidence; this would constitute adverse effects on archeological resources. This problem could be offset by continued ranger patrolling and emphasis on visitor education. New or extended trails are unfavorable to the long-term protection and care of cultural resources in the RMD; overall, impacts would be adverse, site-specific, long-term, and negligible to minor. Alternative A would provide a small incremental impact to the overall cumulative impacts and would be adverse, local, long-term, and moderate.

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 or proclamation of the park; (2) key to the cultural integrity of the park; or (3) identified as a goal in the park’s GMP or other relevant NPS planning documents, there would be no impairment of the park’s resources or values. There would also be no unacceptable impacts as defined in the “Unacceptable Impacts” section of this chapter.

## Alternative B Analysis

Cultural resources adjacent to or easily accessible to visitors from trails 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 distributions, or a reduction of contextual evidence; this would constitute adverse effects on archeological resources. This problem may be offset by continued ranger patrolling and emphasis on visitor education. Section 106 compliance would precede any ground disturbance associated with excavation or construction, including trail maintenance, the closure and revegetation of social trails, and the construction of new trails and trailhead parking areas. NRHP-listed or eligible 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 SHPO and the traditionally associated tribes.

NRHP-listed or eligible historic structures would be maintained on a daily, cyclical, and seasonal basis. Some structures would be stabilized, preserved, or rehabilitated.

### *Cumulative Impacts*

The same general scenario of past, present, and reasonably foreseeable future actions that apply to the no action alternative would also apply to alternative B. Impacts of encroaching development, in addition to increased access to cultural resources, would be overall adverse, local, long-term, and moderate. Alternative B would provide a small incremental impact to the overall cumulative impacts.

### *Conclusion*

The same general scenario of past, present, and reasonably foreseeable future actions that apply to alternative A would also apply to alternative B. The RMD contains four distinct planning areas: Manning Camp, Southern Boundary, Cactus Forest, and Foothills and Mountains. Three new access points and one trailhead are proposed. Alternative B would affect cultural resources in each of the planning areas more so than alternative A because new trails would be added, existing trails would be extended or converted to multiple uses, and new access points would be added. These drawbacks are partially offset by the removal and restoration to natural conditions of six trails. Overall, impacts would be adverse, site-specific, long-term, and negligible to minor.

Cumulative alternative A would provide a small incremental impact to the overall cumulative impacts and would be adverse, local, long-term, and moderate.

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 or proclamation of the park; (2) key to the cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Alternative C Analysis (RMD only)

Alternative C would affect cultural resources in each of the planning areas where new trails are added or existing trails are proposed to be extended or converted to multiple use. These drawbacks are partially offset by the removal and restoration to natural conditions of nine trails. Overall, impacts would be adverse, site-specific, long-term, and negligible to minor.

### *Cumulative Impacts*

The same general scenario of past, present, and reasonably foreseeable future actions that apply to the no action alternative would also apply to alternative C. The addition of new trails or extension of existing trails would contribute to the deterioration of historic trail segments in the RMD. This alternative would also increase access to hitherto remote areas containing cultural resources. Impacts of encroaching development, in addition to increased access to cultural resources, would be overall adverse, local, long-term, and moderate. Alternative C would provide a small incremental impact to the overall cumulative impacts.

### *Conclusion*

The same impacts described for alternative A would occur under alternative C. Overall, impacts would be adverse, site-specific, long-term, and negligible to minor. New or extended trails are unfavorable to the long-term protection and care of cultural resources in the RMD. Cumulative alternative C would provide a small incremental impact to the overall cumulative impacts and would be adverse, local, long-term, and moderate.

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 or proclamation of the park; (2) key to the cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

### Preferred Alternative Analysis

Historic structures and archeological resources adjacent to or easily accessible to visitors from trails 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 distributions, or a reduction of contextual evidence; this would constitute adverse effects on archeological resources. This problem could be offset by continued ranger patrolling and emphasis on visitor education. Section 106 compliance would precede any ground disturbance associated with excavation or construction, including trail maintenance, the closure and revegetation of social trails, and the construction of new trails and trailhead parking areas. NRHP-listed or eligible 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 SHPO and the traditionally associated tribes.

NRHP-listed or eligible historic structures would be maintained on a daily, cyclical, and seasonal basis. Some structures would be stabilized, preserved, or rehabilitated.

The preferred alternative could potentially affect cultural resources in each of the planning areas where new trails are added or existing trails are proposed to be extended or converted to multiple use. Overall, impacts would be adverse, site-specific, long-term, and negligible to minor.

#### *Cumulative Impacts*

The same general scenario of past, present, and reasonably foreseeable future actions that apply to the no action alternative would also apply to the preferred alternative. The addition of new trails or extension of existing trails would contribute to the deterioration of historic trail segments in the RMD. This alternative would also increase access to hitherto remote areas containing cultural resources. Impacts of encroaching development in addition to increased access to cultural resources would be overall adverse, local, long-term, and moderate. The preferred alternative would provide a small incremental impact to the overall cumulative impacts.

#### *Conclusion*

The same impacts described for alternative A would occur under the preferred alternative. Overall, impacts would be adverse, site-specific, long-term, and negligible to minor. New or extended trails are unfavorable to the long-term protection and care of cultural resources in the RMD. The preferred alternative would provide a small incremental impact to the overall cumulative impacts and would be adverse, local, long-term, and moderate.

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 or proclamation of the park; (2) key to the cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Tucson Mountain District

### Alternative A Analysis

Historic structures and archeological resources adjacent to or easily accessible to visitors from trails 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 distributions, or a reduction of contextual evidence; this would constitute adverse effects on archeological resources. This problem could be offset by continued ranger patrolling and emphasis on visitor education. Section 106 compliance would precede any ground disturbance associated with excavation or

construction, including trail maintenance, the closure and revegetation of social trails, and the construction of new trails and trailhead parking areas. NRHP-listed or eligible 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 SHPO and the traditionally associated tribes.

Alternative A would affect cultural resources in each of the planning areas where new trails are added or existing trails are proposed to be extended or converted to multiple use. The same impacts described for alternative A in the RMD would occur in the TMD. Impacts in this area would be adverse, site-specific, long-term, and negligible to minor.

Cumulative Impacts

The same general scenario of past, present, and reasonably foreseeable future actions that apply to the no action alternative would also apply to alternative A. This alternative may also increase access to hitherto remote areas containing significant cultural resources. Impacts of encroaching development in addition to increased access to significant cultural resources would be overall adverse, local, long-term, and moderate. Alternative A would provide a small incremental impact to the overall cumulative impacts.

### *Conclusion*

As described in the RMD, archeological resources adjacent to or easily accessible to visitors from trails 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 distributions, or a reduction of contextual evidence; this would constitute adverse effects on archeological resources. This problem may be offset by continued ranger patrolling and emphasis on visitor education. New or extended trails are unfavorable to the long-term protection and care of significant cultural resources in the TMD; overall, impacts would be adverse, site-specific, long-term, and negligible to minor. Cumulative alternative A would provide a small incremental impact to the overall cumulative impacts and would be adverse, local, long-term, and moderate.

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 or proclamation of the park; (2) key to the cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Alternative B Analysis

Historic structures and archeological resources adjacent to or easily accessible to visitors from trails 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 distributions, or a reduction of contextual evidence; this would constitute adverse effects on archeological resources. This problem may be offset by continued ranger patrolling and emphasis on visitor education. Section 106 compliance would precede any ground disturbance associated with excavation or construction, including trail maintenance, the closure and revegetation of social trails, and the construction of new trails and trailhead parking areas. NRHP-listed or eligible 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 SHPO and the traditionally associated tribes.

Alternative B would affect cultural resources in each of the planning areas even more so than alternative A because new trails would be added, existing trails would be extended or converted to multiple use, new access points and trailheads would be added, and many social trails would be upgraded to formal trails. Impacts in this area would be adverse, site-specific, long-term, and minor.

### *Cumulative Impacts*

The same general scenario of past, present, and reasonably foreseeable future actions that apply to the no action alternative would also apply to alternative B. The proliferation of access points and trailheads and the formalization of social trails would also increase access to hitherto remote areas containing cultural resources. Impacts of encroaching development, in addition to increased access to cultural resources, would be overall adverse, local, long-term, and moderate. Alternative B would provide a small incremental impact to the overall cumulative impacts.

### *Conclusion*

The same impacts described for alternative A would occur under alternative B. New or extended trails, the addition of new access points and trailheads, and formalization of social trails are unfavorable to the long-term protection and care of cultural resources in the TMD. Overall, impacts would be adverse, site-specific, long-term, and negligible to minor. Cumulative alternative B would provide a small incremental impact to the overall cumulative impacts and would be adverse, local, long-term, and moderate.

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 or proclamation of the park; (2) key to the cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## Preferred Alternative Analysis

Historic structures and archeological resources adjacent to or easily accessible to visitors from trails 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 distributions, or a reduction of contextual evidence; this would constitute adverse effects on archeological resources. This problem could be offset by continued ranger patrolling and emphasis on visitor education. Section 106 compliance would precede any ground disturbance associated with excavation or construction, including trail maintenance, the closure and revegetation of social trails, and the construction of new trails and trailhead parking areas. NRHP-listed or eligible 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 SHPO and the traditionally associated tribes.

As in alternative B, the preferred alternative would affect cultural resources in each of the planning areas because new trails would be added, existing trails would be extended or converted to multiple use, new access points and trailheads would be added, and many social trails would be upgraded to formal trails. Impacts in this area would be adverse, site-specific, long-term, and minor.

### *Cumulative Impacts*

The same general scenario of past, present, and reasonably foreseeable future actions that apply to the no action alternative would also apply to the preferred alternative. The proliferation of access points and trailheads and the formalization of social trails would also increase access to hitherto remote areas containing cultural resources. Impacts of encroaching development, in addition to increased access to cultural resources, would be overall adverse, local, long-term, and moderate. The preferred alternative would provide a small incremental impact to the overall cumulative impacts.

### *Conclusion*

The same impacts described for alternative A would occur under the preferred alternative. New or extended trails, the addition of new access points and trailheads, and formalization of social trails are unfavorable to the long-term protection and care of cultural resources in the TMD. Overall, impacts

would be adverse, site-specific, long-term, and negligible to minor. The cumulative preferred alternative would provide a small incremental impact to the overall cumulative impacts and would be adverse, local, long-term, and moderate.

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 or proclamation of the park; (2) key to the cultural integrity of the park; or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of the park's resources or values. There would also be no unacceptable impacts as defined in the "Unacceptable Impacts" section of this chapter.

## *Wilderness Values*

### Methodology

Information about wilderness values 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. Potential impacts are described in terms of type (beneficial or adverse), context (site-specific, local, or regional), duration (short-term, lasting less than one year; or long-term, lasting more than one year). Additionally, the planning team qualitatively evaluated the intensities of effects on all the natural resource impact topics.

### Intensity Thresholds

An inventory of wilderness resources was conducted, and approximately 78% of the park is designated as wilderness.

The intensity thresholds of an impact on wilderness values are defined as follows:

> *Negligible*: A change in the wilderness character would not occur, or if it occurred, would be so small that it would not be of any measurable or perceptible consequence. Natural conditions would prevail and the forces of nature would primarily affect the wilderness area.
>
> *Minor*: A change in the wilderness character and associated values would occur, but it would be small, and if measurable, would be highly localized. Natural conditions would predominate. The wilderness area would generally appear to have been affected primarily by the forces of nature.
>
> *Moderate*: A change in the wilderness character and associated values would occur. It would be measurable and localized or regional. It would be apparent that humans have altered (improved or reduced) natural conditions within such areas. The wilderness area would appear to have been affected primarily by the forces of nature; however, it would be evident that people have affected the area.
>
> *Major*: A noticeable change in the wilderness character and associated values would occur. It would be measurable and would have substantial consequences. Natural conditions would have been substantially altered (improved or reduced) by humans. Changes made by humans would become part of the landscape.

### No Action Alternative

#### Rincon Mountain District

The RMD contains four distinct planning areas; Manning Camp, Southern Boundary, Cactus Forest, and Foothills and Mountains. The no action alternative would affect wilderness values in each of the planning areas as follows:

### *Manning Camp Planning Area*

As described in chapter 3, the Manning Camp Planning Area provides low to moderate opportunities for solitude as well as opportunities for semiprimitive camping, trail use, and cultural resource site viewing. It is primarily zoned Primitive with a user capacity of typically no more than seven groups encountered per day along designated trails. All trails are Class C — single or multiuse trails constructed and maintained for light to moderate use by visitors with intermediate to high skill levels. Class C trails are maintained primarily to minimize resource impacts and are constructed of natural materials; they have moderate to difficult variations and frequent rock or root protrusions. This type of trail classification is most compatible with wilderness values, and the trail classification in this area would not change. Under the no action alternative, no new trails would be constructed in this area.

The Manning Camp Planning Area is remote and includes an access point at the northern end of the park boundary. Manning Camp is reached only via trail on foot or by horseback. As shown in the "Visitor Use and Experience" section of chapter 3, trail use intensity in this area is very low. Less than 3% of park visitors engage in backcountry camping at the park, and there has not been more demand for camping opportunities. User capacity is not likely to exceed Primitive Zone standards.

As noted in the GMP, use of Manning Camp for fire and other management activities is affecting wilderness and natural resource values in the area (NPS 2008c). These management activities would be reduced, and wilderness values, such as opportunities for solitude and prevalence of natural conditions, would improve, thereby supporting the wilderness management objective shown in table 7 of chapter 3, which states, "minimize the amount of administrative facilities located within the wilderness." This change in the wilderness character and associated values would be small, and if measurable, highly localized. Natural conditions would predominate. Opportunities for primitive, unconfined forms of recreation would not likely change as increases in visitor use to this area are not expected. Therefore, impacts on wilderness values in the Manning Camp Planning Area would be beneficial, site-specific, long-term, and minor.

### *Southern Boundary Planning Area*

As mentioned in chapter 2, the Southern Boundary Planning Area was evaluated for wilderness designation; the section north of the Hope Trail was determined a "suitable wilderness expansion area," and the park is treating it as designated wilderness (see figure 16 in chapter 3). The section south of the Hope Camp corridor was deemed to be an unsuitable wilderness expansion area and is therefore not evaluated for wilderness values. As described in chapter 3, the Southern Boundary Planning Area provides moderate to high opportunities for solitude in an unmodified environment. It is zoned Primitive to the north and Natural along the Hope Camp corridor. The Hope Camp corridor, being a Natural Zone, allows trail types A through C, with type C being the most wilderness-compatible.

The current use levels near Madrona, in the northern part of this planning area where highly diverse and sensitive natural resources occur, are very low (NPS 2008c). Access to this area is difficult due to private land to the south that denies public entry. For this reason, user capacity is not likely to exceed Primitive Zone standards, and wilderness values near Madrona, particularly naturalness, would remain high.

Wilderness values in the remainder of this area would also likely remain high due to its somewhat remote access and fewer trail use opportunities. However, visitation may increase as a result of relocation of the Arizona Trail, which would terminate at the park's southern boundary. Under the no action alternative, a new route within the park connecting to the Arizona Trail would not be considered, potentially resulting in creation of social trails into the park. The presence of new social trails would adversely affect wilderness values such as naturalness. Sprawling social trails may diminish solitude because use would be dispersed rather than concentrated along an official trail. A small change in the wilderness character and associated values would occur in this highly localized area, resulting in adverse minor site-specific long-term impacts on wilderness values.

### *Cactus Forest Planning Area*

Part of the Cactus Forest Planning Area lies within designated wilderness; however, a large part encompassing Cactus Forest Drive and trails directly north of it does not. Trails originating at the Wildhorse and Douglas Spring trailhead begin in wilderness; trails originating at the Broadway trailhead do not although some of those trails lead to wilderness. Trails are denser in the wilderness area, which compromises wilderness values. Those trails that lie within the wilderness area (primarily the easternmost trails in this planning area) are zoned Primitive, with a user capacity of typically no more than seven groups encountered per day along designated trails (trails in the western part of the planning area are Semi-primitive). This limit is likely exceeded on high use days, particularly along the Douglas Spring Trail. Primitive Zone trails are Class C — single or multiuse trails constructed and maintained for light to moderate visitor use. However, heavy trail use in the Cactus Forest Planning Area exceeds this maintenance criterion. Trails are maintained primarily to minimize resource impacts and increase visitor safety.

Although chapter 3 describes the Cactus Forest Opportunity Class as characterized by a largely natural or natural appearing environment transitioning from the urban environment, this area includes high concentrations of redundant, maintenance-dependent trails. The widened and braided trails in this area that have resulted from poor design and high use would remain, diminishing wilderness values of naturalness. The rock steps located in this planning area are not appropriate in wilderness, but they would also remain. Although the trail system in this area is described as being able to "accommodate high numbers of day users, including pack stock," as evidenced by increased number of social trails, this condition is no longer true and would remain so under the no action alternative. One of the park's wilderness management objectives is to "provide as much solitude and unconfined recreation as possible without degrading the wilderness." The presence of rapidly expanding social trails does not give the park an appearance of a wilderness that is "untrammeled by man," as defined by the *Wilderness Act* (see the "Wilderness Values" section in chapter 1). Social trails and trails widened by erosion also do not appear to be "affected primarily by the forces of nature." Under the no action alternative, no new trails would be constructed to alleviate or redirect trail use, so wilderness values would likely decline.

Opportunities for solitude in this area are moderate to low, and visitor management is fairly intensive. Dense trails in this popular area impact the experience of solitude. Nearly all of the "special places" identified by visitors for this district are located in the Cactus Forest Planning Area (see the "Visitor Use and Experience" section in this chapter), particularly Douglas Spring. The Broadway, Wild Horse, and Douglas Spring trailheads are the three highest used trailheads not only in this area but in the entire district. During high use days, solitude may not be possible, particularly near crowded trailheads and given the proximity of major roads. Traffic and sounds outside the park can be heard; natural quiet is not possible in this area for those reasons alone. As visitation increases and use of unofficial social trails and washes increases, visitors would become more dispersed within a small area, resulting in a sense of being surrounded by sound and human presence. Increasingly crowded conditions would deprive visitors of experiencing "outstanding opportunities for solitude or a primitive and unconfined type of recreation."

Given the high density of trails and visitor use in this area, lack of trails management would continue to erode wilderness values for the reasons described above. Without the benefits of a comprehensive trails plan, difficulty in maintaining existing trails would prevent park staff from "protecting and managing [wilderness] so as to preserve its natural conditions." This change to wilderness characteristics would be measurable but localized. One of the park's wilderness management objectives is to "provide for a variety of recreation opportunities appropriate in wilderness and at levels to protect resources." Under the no action alternative, resources would not be sufficiently protected, and wilderness values would therefore continue to decline. Vandalism and damage to vegetation, which in turn impacts wildlife, also degrade the park's "natural conditions" and would continue to do so. Although the wilderness area would appear to have been affected primarily by the forces of nature, it would be evident that humans have affected the

area. Therefore, impacts on wilderness values would be adverse, specific to the Cactus Forest Planning Area, long-term, and moderate.

### *Foothills and Mountains Planning Area*

As described in chapter 3, the Foothills and Mountains Planning Area provides moderate to high opportunities for solitude as well as opportunities for semiprimitive camping, trail use, and viewing of cultural resource sites. It is zoned Primitive, with a user capacity of typically no more than seven groups encountered per day along designated trails.

As shown under the "Visitor Use and Experience" section of this chapter, the Douglas Spring Trail, which originates in the Cactus Forest Planning Area and extends into the Manning Camp Planning Area, is one of the highest used trails in the park and this planning area. While most use is concentrated in the Cactus Forest Planning Area for day hiking, the Douglas Spring Camping Area was identified by visitors as a "special place" that receives high numbers of visitors (see "Visitor Use and Experience" in this chapter). Therefore, opportunities for solitude, unconfined recreation, and natural conditions are likely lower along the Douglas Spring Trail than other sections of this planning area. As visitation is expected to increase along with increases in population in the Tucson area, use of this popular trail may also increase.

The Tanque Verde Ridge Trail is less popular than the Douglas Spring Trail but includes some "special places" as indicated by visitors and receives fairly high use. The Tanque Verde Ridge Trail is high and a great deal of noise can be heard along the trail, such as sounds of Tucson and other urban noise, which diminishes opportunities for solitude. The other trails in this planning area are quite remote and receive little visitor use, providing more opportunities to experience wilderness values.

A small, highly localized change in the wilderness character and associated values would occur in this planning area, primarily along the Douglas Spring and Tanque Verde Ridge trails. Natural conditions would predominate, particularly throughout the rest of this planning area, which would generally appear to have been affected primarily by the forces of nature. Therefore, impacts would be adverse, localized, long-term, and minor.

### *Access Points and Trailheads*

Although parking lots are not allowed in wilderness areas, two — at the Wildhorse and Douglas Spring trailheads — lie just outside the wilderness boundary in the Cactus Forest Planning Area. Noise and crowding at these trailheads are currently an issue that would continue to worsen under the no action alternative without adequate planning and management. Visitors using the wilderness area trails in the vicinity of these access points would experience adverse impacts on solitude and naturalness that would be localized, long-term, and moderate, as it would be apparent that humans have altered natural conditions and that humans have affected the area.

### *Cumulative Impacts*

Many past activities, such as grazing, woodcutting, and fire suppression, have had an adverse effect on the landscape and natural environment, and thus have affected the wilderness characteristics of the park. Other measures undertaken since the park was formed, such as exotic plant and fire management activities, have had beneficial effects although to a lesser degree given the extent of past damage. The boundary fence surrounding each district also helps prevent damage to the wilderness character by preventing further grazing and use of off-road vehicles within the park.

Encroaching post-war, and more recent urban, development, along with associated increases in traffic and airport noise, has placed and would continue to place burdens on the park as open space becomes more valuable. The result has been, and would continue to be, increased use of trailheads and trails and diminished solitude. Residential developments that abut the park's boundaries result in social trails into the park that affect wilderness values. Although plans for nearby conservation areas and forests would beneficially affect those areas and wilderness values therein (regardless of whether or not they are official

wilderness areas), as development and growth continues in the Tucson metro area, wilderness characteristics, such as solitude, would become increasingly rare.

Combined with the primarily adverse impacts expected under the no action alternative, cumulative impacts would be adverse, regional, long-term, and moderate as measurable changes to the wilderness character and values would occur, and it would be apparent that humans have altered natural conditions in the area. The no action alternative would provide a small incremental impact to overall cumulative impacts.

#### *Conclusion*

The no action alternative would not support many of the park's *Wilderness Management Plan* objectives, and without a specific plan to address trail use, several management actions identified as necessary in the RMD's *Wilderness Management Plan* would be difficult to apply, such as "work to limit level of use to current level," and "designate trails that should be limited to foot traffic only." Adverse impacts would be most notable in the Cactus Forest Planning Area, with long-term moderate impacts. With the exception of the Manning Camp Planning Area, the other areas would experience adverse long-term localized minor impacts. Reduced management use of Manning Cabin for park management activities would result in beneficial site-specific long-term minor impacts at the Manning Camp Planning Area. Visitors using the wilderness area trails in the vicinity of access points would experience adverse impacts on solitude and naturalness that would be localized, long-term, and moderate. Cumulative impacts would be adverse, regional, long-term, and moderate.

### Tucson Mountain District

Unlike the RMD, no wilderness management plan has been done for the TMD. Some washes in this district have already been designated as trails, and no new washes would be designated.

The TMD contains four distinct planning areas; the Northeast Corner, Northwest Area, East Boundary, and South Central Area. The no action alternative would affect wilderness values in each of the planning areas as follows:

#### *Northeast Corner Planning Area*

The area directly south of the state land located in the Northeast Corner is the only section of this planning area that is a suitable wilderness expansion area. The rest of the land is state-owned, private, or not suitable for wilderness expansion. No official trails exist in this area, and none are planned under this alternative. No changes to wilderness character or values are expected in the suitable wilderness expansion area in the Northeast Corner Planning Area.

#### *Northwest Planning Area*

The majority of this planning area includes wilderness or suitable wilderness expansion areas, with the exception of state-owned land to the far northwest and some small parcels to the south that are not suitable for wilderness expansion. One of these parcels includes the CCC camp; therefore, wilderness values do not apply there. Official trails provide access to this area's wilderness although no new trails would be developed. The majority of the area is zoned Primitive (which allows for trail type C as described previously). Closing social trails would enhance wilderness values by restoring naturalness. This beneficial impact would be so small as to be barely measurable or perceptible, resulting in a localized long-term negligible effect.

#### *East Boundary Planning Area*

The only wilderness in this planning area is a small section of a suitable wilderness expansion area to the south. No official trails exist in this section of suitable wilderness, and none are planned under this alternative. There would be no change to wilderness values or characteristics.

### *South Central Planning Area*

The majority of this planning area is located in wilderness or suitable wilderness, and most of it is zoned Primitive. Although Golden Gate Road is located within a corridor of non-wilderness, closing it and converting it to a multiuse trail would enhance nearby wilderness values and characteristics by eliminating motor vehicle traffic and would be compatible with the primarily Primitive zoning in the South Central Planning Area. No other changes would affect wilderness in this area. Impacts would be beneficial and measurable but localized, resulting in long-term moderate effects.

### *Access Points and Trailheads*

Visitors using the wilderness area trails in the vicinity of trailheads might experience adverse impacts on solitude and naturalness. If such a change occurred, it would be small and highly localized, resulting in an adverse long-term minor impact.

### *Cumulative Impacts*

The same general scenario of past, present, and reasonably foreseeable future actions that apply to the RMD would also apply to the TMD, particularly encroaching development. The use of Picture Rocks Road as a commuter corridor through the park also further diminishes wilderness values in the TMD. No or mostly beneficial impacts are expected on wilderness characteristics and values under the no action alternative. When combined with the general scenario described for the RMD, cumulative impacts would be adverse, regional, long-term, and moderate because the effects of the no action alternative would provide a small incremental impact to overall cumulative impacts.

### *Conclusion*

Social trails would continue to develop adjacent to wash banks, resulting in adverse long-term minor impacts related to washes throughout this district. No changes to wilderness character or values are expected in the suitable wilderness expansion area in the Northeast Corner Planning Area. Closing social trails in the Northwest Planning Area would enhance wilderness values by restoring naturalness. This beneficial impact would be localized, long-term, and negligible. There would be no change to wilderness values or characteristics in the East Boundary Planning Area, which includes only a small section of wilderness. Impacts from closing Golden Gate Road in the South Central Planning Area would be beneficial, localized, long-term, and moderate. Cumulative impacts would be adverse, regional, long-term, and moderate.

## Rincon Mountain District

### Alternative A Analysis

Alternative A would affect wilderness values in each of the planning areas as follows:

### *Manning Camp Planning Area*

The Bonita Trail would be removed and restored to natural conditions, which would enhance wilderness values in this planning area. No additional change would occur; all other trails in this planning area would remain. Therefore, impacts under alternative A would be similar to the no action alternative, with a small and highly localized additional benefit to the wilderness character and associated values. Natural conditions would predominate. Impacts on wilderness values in the Manning Camp Planning Area would be beneficial, site-specific, long-term, and minor.

### *Southern Boundary Planning Area*

Under alternative A in the Southern Boundary Planning Area, the Hope Camp Trail would be converted to multiuse, and the eastern end of the trail would be extended to the southern park boundary where a new access point would be located. However, this new trail extension and access point would be located

outside of the suitable wilderness expansion area, so wilderness values would not apply. The Hope Camp Trail is zoned Natural, with no more than 45 people encountered per hour along designated trails. As noted under the no action alternative, only the section of this planning area north of the Hope Camp Trail is suitable for wilderness expansion. The addition of bicycles along this trail, along with increased use overall that could be expected with a new access point, may diminish wilderness values, such as solitude, to the north of the trail.

The Arizona Trail would connect to the Hope Camp Trail and continue 4.2 miles northeast within the park to connect with the Manning Camp Trail. Although adding a new trail segment would diminish wilderness values, doing so would reduce or eliminate the number of social trails at this location that are expected under the no action alternative, resulting in a beneficial long-term negligible impact from concentrating use along an official trail.

Under alternative A, the North Hope Camp Trail, which extends north into lands suitable for wilderness, would be removed and restored to natural conditions, resulting in a beneficial impact on wilderness values. Overall, long-term impacts on wilderness values in the Southern Boundary Planning Area would be primarily beneficial, with minor changes to the wilderness character and associated values due to the addition of bicycle use and increased visitation, a new connection to the Arizona Trail, and closure and restoration of the North Hope Camp Trail.

### *Cactus Forest Planning Area*

Under alternative A, the Lime Falls Trail proposed extension as well as a new trail from the Shantz Trail to the Mica View Picnic Area would be outside the wilderness area, so wilderness values would not be affected. A short trail segment, Ernie's Falls, would connect the Douglas Spring Trail near Bridal Wreath Falls to the park boundary to the north. This trail would be within the wilderness boundary and would result in a small impact on wilderness values in this area. Ten trails would be removed and restored to natural conditions, the majority of which do lie within wilderness. Three washes, two of which are in wilderness, would be designated as trails; all others would be closed to trail use.

The overall effect would result in concentrating visitor use rather than dispersing it among several trails within a dense trail network. As noted in the RMD's *Wilderness Management Plan*, soil, vegetation, wildlife habitat, and water resources management are priorities in the Cactus Forest Opportunity Class. The *Wilderness Management Plan* also notes that management of visitors includes removal of all social trails. Closing and restoring redundant trails and washes as a management priority, as well as undertaking minor reroutes, would improve natural conditions and thus, wilderness values. Solitude may be marginally improved. The result would be a small, localized change in the wilderness character and values in this area with impacts that are beneficial, site-specific, long-term, and minor.

### *Foothills and Mountains Planning Area*

No change would occur under alternative A compared to the no action alternative. Impacts would be adverse, localized, long-term, and minor.

### *Access Points and Trailheads*

The impacts described under the no action alternative would be slightly reduced by the construction of new parking lots and better distribution of visitors that would result in the alleviation of crowding. The result to nearby wilderness values would be a small improvement to solitude. A new access point would be located at the southern boundary and another at the new Ernie's Falls Trail. No parking would be provided at these locations, so impacts would result only from increased trail use in the park. Overall, impacts on wilderness values related to access points and trailheads would be so small as to not be measurable or perceptible, resulting in beneficial and adverse localized long-term negligible effects.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to this alternative. Impacts expected under alternative A vary from adverse (such as increased visitation) to beneficial (such as restoring the Bonita Trail), depending on the planning area. When combined with the scenario described earlier, cumulative impacts would be adverse, regional, long-term, and moderate because the effects of this alternative would provide only a small incremental impact to overall cumulative impacts.

### *Conclusion*

In the Manning Camp Planning Area, the Bonita Trail would be removed and restored to natural conditions, resulting in beneficial site-specific long-term minor impacts in this area. Overall, long-term impacts on wilderness values in the Southern Boundary Planning Area would be primarily beneficial. Closing and restoring redundant trails and washes would improve natural conditions in the Cactus Forest Planning Area, and thus, wilderness values would be improved. Impacts would be beneficial, site-specific, long-term, and minor. No change would occur at the Foothills and Mountains Planning Area compared to the no action alternative. Impacts would remain adverse, localized, long-term, and minor. Impacts on wilderness values related to access points and trailheads would be beneficial and adverse, localized, long-term, and negligible. Cumulative impacts of alternative A would be adverse, regional, long-term, and moderate.

## Alternative B Analysis

Alternative B would affect wilderness values in each of the planning areas as follows:

### *Manning Camp Planning Area*

No change would occur under alternative B compared to the no action alternative. Impacts would be beneficial, site-specific, long-term, and minor.

### *Southern Boundary Planning Area*

The two new trails and associated access points proposed for this area would be located outside of wilderness in the area not suitable for wilderness expansion, so wilderness values would not be affected. Unlike alternative A, bicycles would not be allowed on the Hope Camp Trail, and the North Hope Camp Trail would not be removed and restored to natural conditions. Therefore, there would be no change compared to baseline conditions (the no action alternative), with the exception of impacts related to the Arizona Trail. Under this alternative, the Arizona Trail would enter the park on its western boundary to connect to the Tanque Verde Ridge Trail, which is in the Foothills and Mountains Planning Area. The social trails expected under the no action alternative relative to termination of the Arizona Trail in this area would not apply. Therefore, long-term impacts would be beneficial and so small as to be barely measurable or perceptible, resulting in negligible effects on this planning area.

### *Cactus Forest Planning Area*

Under alternative B, the hiker only trail proposed around Javalina Rocks, as well as Javelina Wash, would be outside the wilderness boundary. Fewer trails (6) would be removed and restored to natural conditions compared to alternative A, but nearly all lie within wilderness. Impacts of doing so would be similar to alternative A, but on a smaller scale because fewer trails would be restored. Ernie’s Falls Trail and access would be developed as under alternative A. Creating these new official trails would result in a small localized impact on wilderness values that would be both beneficial (distributing visitor use) and adverse (creating a human-made trail). The Carillo and Garwood trails would be converted to hiker only trails, with minimal, if any, impacts on wilderness values because the Cactus Forest Opportunity Class (as defined in the park’s *Wilderness Management Plan*) describes the trail system as accommodating packstock, which would have access to all remaining trails in the area. Similar to alternative A, the result would be a small, localized change in the wilderness character and values in this area, with impacts that are primarily beneficial, site-specific, long-term, and minor.

### *Foothills and Mountains Planning Area*

Under alternative B, the Arizona Trail would enter the western boundary of the park at an existing trailhead. The Arizona Trail would continue through the park following the Tanque Verde Ridge Trail. The result would be more hikers using the existing Tanque Verde Ridge Trail (which is currently closed to stock use), with adverse impacts on solitude on a trail where a great deal of noise can be heard, such as sounds of Tucson and other urban noise. However, social trails would not form where the Arizona Trail currently terminates at the park's southern boundary, as expected under the no action alternative. Adverse impacts related to increased use of the Tanque Verde Ridge Trail would be small and localized, resulting in a minor long-term effect specific to this trail. No other changes would occur under this alternative.

### *Access Points and Trailheads*

The two new access points proposed for the Southern Boundary Planning Area would not be located in wilderness. The access point proposed at the new Ernie's Falls Trail would have the same impacts as alternative A. A new trailhead would be constructed at the eastern terminus of Broadway Boulevard that would be near, but not adjacent to, the wilderness boundary. Creating a new trailhead at this location may help disperse visitors using trails that lead to the wilderness, but no change in the wilderness character is expected.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to this alternative. Although impacts expected under this alternative are expected to be primarily beneficial, when combined with the scenario described earlier, cumulative impacts would be adverse, regional, long-term, and moderate because the effects of this alternative would provide only a small incremental impact to overall cumulative impacts.

### *Conclusion*

No change would occur at the Manning Camp Planning Area compared to the no action alternative. Impacts would be beneficial, site-specific, long-term, and minor. Long-term impacts at the Southern Boundary Planning Area would be beneficial and so small as to be barely measurable or perceptible, resulting in negligible effects. Impacts at Cactus Forest Planning Area would be similar to alternative A, with a small, localized change in the wilderness character and values, resulting in beneficial site-specific long-term minor impacts. At the Foothills and Mountains Planning Area, adverse impacts related to increased use of the Tanque Verde Ridge Trail as a connection to the Arizona Trail would be small and localized, resulting in a minor long-term effect. No change in the wilderness character is expected from changes to access and trailheads. Cumulative impacts would be adverse, regional, long-term, and moderate.

## Alternative C Analysis

### *Manning Camp Planning Area*

The same actions described for alternative A would occur under alternative C. Impacts in this area would be beneficial, site-specific, long-term, and minor.

### *Southern Boundary Planning Area*

The same actions described for alternative B (with associated beneficial site-specific long-term negligible impacts) would occur under alternative C, with the exception that bicycles would be allowed on Hope Camp Trail. The addition of bicycles along this trail, along with increased use, overall may diminish wilderness values, such as solitude, to the north of the trail. The Arizona Trail would connect to the Hope Camp Trail and continue 4.2 miles northeast within the park to connect with the Manning Camp Trail. Although adding a new trail segment would diminish wilderness values, doing so would reduce or

eliminate the number of social trails at this location that are expected under the no action alternative, resulting in a beneficial long-term negligible impact from concentrating use along an official trail.

Overall, impacts would be beneficial with minor changes to the wilderness character and associated values due to the addition of bicycle use and increased visitation, a new connection to the Arizona Trail, and closure and restoration of the North Hope Camp Trail.

### *Cactus Forest Planning Area*

Under alternative C, a multiuse trail in the Cactus Forest Loop area, a new hiker only trail around Javelina Rocks, and a new trail originating at the proposed Freeman Road access, would be outside the wilderness area, so wilderness values would not be affected. Nine trails would be removed and restored to natural conditions, the majority of which do lie within wilderness. Five major washes, which would include Javelina Wash and its tributaries— two of which are in wilderness, would be designated as trails; all others would be closed to trail use. The overall effect would result in concentrating visitor use rather than dispersing it among several trails within a dense trail network. Closing and restoring nine redundant trails would improve natural conditions and thus, wilderness values. Solitude may be marginally improved. The result would be a small localized change in the wilderness character and values in this area, with impacts that are beneficial, site-specific, long-term, and minor.

### *Foothills and Mountains Planning Area*

The same actions described for the no action alternative would occur under alternative C. Impacts in this area would be adverse, localized, long-term, and minor.

### *Access Points and Trailheads*

The three access points and trailheads proposed for alternative B would be the same under alternative C. Impacts on wilderness values related to access points and trailheads would be so small as to not be measurable or perceptible, resulting in beneficial and adverse localized long-term negligible effects. A proposed access point along the northern boundary, at the intersection of Speedway and Wentworth; an access point along Freeman Road, which would connect to the Shantz Trail via a new trail; and an access point along the western boundary at the intersection of Old Spanish Trail (Irvington) at Shurban Wash would be outside the wilderness area, so wilderness values would not be affected. As in alternative B, two additional access points would be located along the southern boundary at Coyote Creek and Hope Camp trails; these would not be located in wilderness areas.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to alternative C. Although impacts expected under alternative C are expected to be primarily beneficial, when combined with the scenario described earlier, cumulative impacts would be adverse, regional, long-term, and moderate because the effects of this alternative would provide only a small incremental impact to overall cumulative impacts.

### *Conclusion*

In the Manning Camp Planning Area, the Bonita Trail would be removed and restored to natural conditions, resulting in beneficial site-specific long-term minor impacts in this area. Overall, long-term impacts on wilderness values in the Southern Boundary Planning Area would be primarily beneficial. Closing and restoring redundant trails and washes would improve natural conditions at Cactus Forest and thus, wilderness values. Impacts would be beneficial, site-specific, long-term, and minor. No change would occur at the Foothills and Mountains Planning Area compared to the no action alternative. Impacts would remain adverse, localized, long-term, and minor. Impacts on wilderness values related to access points and trailheads within wilderness areas would be beneficial and adverse, localized, long-term, and negligible. Cumulative impacts would be adverse, regional, long-term, and moderate.

### Preferred Alternative Analysis

The preferred alternative would affect wilderness values in each of the planning areas as follows:

#### *Manning Camp Planning Area*

No change would occur at the Manning Camp Planning Area compared to the no action alternative. Impacts would be beneficial, site-specific, long-term, and minor.

#### *Southern Boundary Planning Area including the Arizona Trail*

As in alternative C, impacts under the preferred alternative would be beneficial, site-specific, long-term, and negligible.

#### *Cactus Forest Planning Area*

Under the preferred alternative, fewer trails (7) would be removed and restored to natural conditions compared to alternative A, but nearly all of these trails lie within wilderness. Impacts of doing so would be similar to alternative A, but on a smaller scale because fewer trails would be restored. The Wentworth Trail between the Garwood and Douglas Springs trails would be converted to a hiker only trail, with minimal, if any impacts on wilderness values because packstock would have access to other trails in the area. The Mica View Trail and Picnic Area, as well as the Lime Falls Trail and its proposed extension, lie outside the wilderness area, so wilderness values would not be affected. Similar to alternative A, the result would be a small localized change in the wilderness character and values in this area, with impacts that are beneficial, site-specific, long-term, and minor.

Impacts related to converting washes to designated trails would be the same as alternative C. The differences between the preferred alternative and alternative C involve three washes that are all outside the wilderness area and which therefore would not be affected.

#### *Foothills and Mountains Planning Area*

As in the no action alternative, impacts under the preferred alternative would be adverse, localized, long-term, and minor.

#### *Access Points and Trailheads*

The two new access points proposed for the Southern Boundary Planning Area in the preferred alternative would not be located in wilderness. The access point proposed at the new Ernie's Falls Trail would have the same impacts as alternative A. The relocated Wentworth access point (and associated trail realignments) would be outside wilderness, which may help disperse visitors using trails that lead to the wilderness, but no change in the wilderness character is expected. Therefore, any resulting beneficial impacts would be localized, long-term, and negligible.

#### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to the preferred alternative. Although impacts expected under this alternative are expected to be primarily beneficial, when combined with the scenario described earlier, cumulative impacts would be adverse, regional, long-term, and moderate because the effects of the preferred alternative would provide only a small incremental impact to overall cumulative impacts.

#### *Conclusion*

As in the no action alternative, the impacts for the Manning Camp Planning Area and the Foothills and Mountains Planning Area in the preferred alternative would be beneficial, site-specific, long-term, and minor and adverse, localized, long-term, and minor, respectively. As in alternative C for the Southern Boundary Planning Area, the preferred alternative impacts would be beneficial, site-specific, long-term,

and negligible. Impacts at the Cactus Forest Planning Area would be beneficial, site-specific, long-term, and minor. Any beneficial impacts resulting from relocating the Wentworth access point would be localized, long-term, and negligible. Cumulative impacts of the preferred alternative would be adverse, regional, long-term, and moderate.

## Tucson Mountain District

### Alternative A Analysis

As in the no action alternative, under alternative A, no washes would be designated as official trails, and impacts would be the same. Alternative A would affect wilderness values in each of the planning areas as follows:

#### *Northeast Corner Planning Area*

The interior loop trail proposed for the Northeast Corner Planning Area would be located in an area not suitable for wilderness expansion. Restoring social trails and allowing them to return to natural conditions would have a small, highly localized impact in this area adjacent to housing developments. Resulting impacts under alternative A would be beneficial, localized, long-term, and minor. No other impacts on wilderness are expected in this area.

#### *Northwest Planning Area*

A new hiker only trail to Panther and Safford Peaks would traverse a suitable wilderness expansion area. Introducing hikers to a wilderness area that currently has no trails would result in decreased solitude and naturalness from the presence of a human-made trail. However, natural conditions would predominate, and the area would generally appear to be affected primarily by the forces of nature. Therefore, adverse impacts under alternative A would be localized, long-term, and minor. The new ADA trail to the CCC camp would not be located in wilderness or suitable wilderness so no impacts from that action would occur.

#### *South Central Planning Area*

The same impacts described under the no action alternative related to closing Golden Gate Road to motor vehicle traffic would also apply to alternative A; impacts would be beneficial, localized, long-term, and moderate. The new trail connecting Picture Rocks Wash with Prophecy Wash would traverse wilderness, introducing hikers to an area that currently has no trail. However, this new trail would connect two existing trails, so impacts on solitude and naturalness would be minimal. Any change to wilderness character would be small and barely perceptible. Natural conditions and the forces of nature would predominate. Adverse impacts of this action would be localized, long-term, and negligible. The other actions proposed under alternative A would be located in non-wilderness areas, so no impacts on wilderness values or characteristics would occur.

#### *East Boundary Planning Area*

The formalization of social trails under alternative A would occur in an area of non-wilderness. Restoring all other social trails and old roads in the East Boundary Planning Area’s only section of wilderness would result in beneficial localized long-term minor impacts as these changes would be small and highly localized.

#### *Access Points and Trailheads*

None of the proposed access points and trailheads for alternative A would be located in wilderness or suitable wilderness, resulting in no impacts on wilderness values and characteristics.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to alternative A. Impacts expected under this alternative vary from adverse (e.g., creating a new trail to Panther and Safford Peaks) to beneficial (e.g., closing Golden Gate Road to motor vehicle use), depending on the planning area. When combined with the scenario described earlier, cumulative impacts of alternative A would be adverse, regional, long-term, and moderate because the effects of this alternative would provide only a small incremental impact to overall cumulative impacts.

### *Conclusion*

Under alternative A, social trails would continue to develop adjacent to wash banks, resulting in adverse long-term minor impacts related to washes throughout the TMD. Restoring social trails in all planning areas would result in beneficial localized long-term minor impacts. A new hiker only trail to Panther and Safford Peaks in the Northwest Planning Area would have adverse localized long-term minor impacts. The same impacts described under the no action alternative related to closing Golden Gate Road to motor vehicle traffic in the South Central Planning Area would also apply to this alternative; impacts would be beneficial, localized, long-term, moderate. No impacts related to access points and trailheads would affect wilderness values and characteristics under alternative A. Cumulative impacts would be adverse, regional, long-term, and moderate.

## Alternative B Analysis

Alternative B would affect wilderness values in each of the planning areas as follows:

### *Northeast Corner Planning Area*

The same actions described for alternative A would occur under alternative B. Impacts in this area would be beneficial, localized, long-term, and minor.

### *Northwest Planning Area*

The same impacts expected under alternative A would apply to alternative B due to the location of wilderness in the Northwest Planning Area. Impacts would be adverse, localized, long-term, and minor.

### *South Central Planning Area*

The same impacts expected under alternative A would apply to alternative B due to the location of wilderness in the South Central Planning Area. Impacts would be adverse, localized, long-term, and negligible.

### *East Boundary Planning Area*

The same impacts expected under alternative A would apply to alternative B due to the location of wilderness in the East Boundary Planning Area and with the exception of converting Animal Wash to an official trail. This conversion may help reduce impacts from social trails adjacent to wash banks as described under the no action alternative. This area is zoned Primitive or Semi-primitive, with Class B and C trails that are compatible with wilderness values. Impacts from this action and from restoring social trails would be beneficial, localized, long-term, and minor.

### *Access Points and Trailheads*

None of the proposed access points and trailheads for alternative B would be located in wilderness or suitable wilderness, resulting in no impacts on wilderness values and characteristics.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to alternative B. Under alternative B, impacts are expected to be primarily the same as alternative A and would vary from adverse to beneficial, depending on the planning area. When combined with the scenario described earlier, cumulative impacts would be adverse, regional, long-term, and moderate because the effects of alternative B would provide only a small incremental impact to overall cumulative impacts.

#### *Conclusion*

Under alternative B, impacts for all planning areas would be the same as alternative A because the actions proposed under alternative B that differ from alternative A would occur in non-wilderness areas. None of the proposed access points and trailheads for alternative B would be located in wilderness or suitable wilderness, resulting in no impacts on wilderness values and characteristics. Cumulative impacts would be adverse, regional, long-term, and moderate.

### Preferred Alternative Analysis

The preferred alternative would affect wilderness values in each of the planning areas as follows:

#### *Northeast Corner Planning Area*

The same actions described for alternative A would occur under the preferred alternative. Impacts would be beneficial, localized, long-term, and minor.

#### *Northwest Planning Area*

Under the preferred alternative, the Cactus Wren and Manville Trail would be converted from hiker only to equestrian use. Because packstock are permitted in wilderness areas, no impact is expected from this change.

#### *South Central Planning Area*

The new trail connecting Picture Rocks Wash with Prophecy Wash would traverse wilderness, introducing hikers to an area that currently has no trail. However, this new trail would connect two existing trails, so impacts on solitude and naturalness would be minimal. The designation of King Canyon Wash is also within wilderness. Any change to wilderness character would be small and barely perceptible. Natural conditions and the forces of nature would predominate. Adverse impacts of the preferred alternative would be localized, long-term, and negligible. The other actions proposed under the preferred alternative would be located in non-wilderness areas, so no impacts on wilderness values or characteristics would occur.

#### *East Boundary Planning Area*

The same impacts expected under alternative B would apply to the preferred alternative due to the location of wilderness in the East Boundary Planning Area. Impacts would be beneficial, localized, long-term, and minor.

#### *Access Points and Trailheads*

None of the proposed access points and trailheads for the preferred alternative would be located in wilderness or suitable wilderness, resulting in no impacts on wilderness values and characteristics.

#### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to the preferred alternative. No impacts are expected under the preferred alternative in some planning areas; other impacts are expected to be primarily the same as alternative A and would vary from adverse to beneficial. When combined with the scenario described

earlier, cumulative impacts would be adverse, regional, long-term, and moderate because the effects of the preferred alternative would provide only a small incremental impact to overall cumulative impacts.

*Conclusion*

Under the preferred alternative, impacts would be the same as alternative A for the Northeast Corner and the East Boundary planning areas. No impact is expected in the Northwest or South Central planning areas, and no impacts would occur related to access points and trailheads. Cumulative impacts would be adverse, regional, long-term, and moderate.

## *Visitor Use and Experience*

### Methodology

Information about visitor use and experience was compiled and compared with the locations of proposed 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. Potential impacts are described in terms of type (beneficial or adverse), context (site-specific, local, or regional), duration (short-term, lasting less than one year or long-term, lasting more than one year). Additionally, the planning team qualitatively evaluated the intensities of effects on all the natural resource impact topics.

### Intensity Thresholds

Park visitation has remained relatively stable since 2002 but is expected to increase in 2008 (NPS 2006d). Popular recreational activities in both districts include auto touring, bird watching, hiking, nature walks, horseback riding, bike riding, and wildlife viewing. The impact on the ability of the visitor to experience a full range of parks resources can be analyzed by examining resources mentioned in the park significance statement.

The intensity thresholds of an impact on visitor use and experience are defined as follows:

> *Negligible*: Impacts on visitors use, or conflicts between different users or user groups, would be barely detectable and/or would affect few visitors. Visitors would not likely be aware of the effects associated with management actions.
>
> *Minor*: Impacts on visitor use, conflicts between different users or user groups, and/or visitor experience would be detectable although the changes would be slight. Few visitors would be affected.
>
> *Moderate*: Impacts on visitor use, conflicts between different users or user groups, and/or visitor experience would be readily apparent. Many visitors would be affected and would likely express an opinion about the effects.
>
> *Major*: Impacts on visitor use, conflicts between different users of user groups, and/or visitor experience would be readily apparent and have important consequences. Most visitors would be affected and would likely express a strong opinion about the effects.

### No Action Alternative

#### Rincon Mountain District

The RMD contains four distinct planning areas; Manning Camp, Southern Boundary, Cactus Forest, and Foothills and Mountains. Under the no action alternative, all washes throughout the RMD would be closed to trail use because none have been, or would be, officially designated as trails. This would occur in all planning areas, resulting in a primarily adverse impact as some visitors would view this as losing

trails although some visitors may view closure and restoration of washes as a benefit to the natural conditions that comprise their park experience. Impacts related to wash closures would be primarily adverse, district-wide, long-term, and moderate, as the impact would be readily apparent, and many visitors would likely express an opinion about it. Remaining actions under the no action alternative would affect visitor use and experience in each of the planning areas as follows:

### *Manning Camp Planning Area*

The Manning Camp Planning Area is primarily zoned, with a user capacity of typically no more than seven groups encountered per day along designated trails. All trails are Class C — single or multiuse trails constructed and maintained for light to moderate use by visitors with intermediate to high skill levels. Class C trails are maintained primarily to minimize resource impacts and are constructed of natural materials; they have moderate to difficult variations and frequent rock or root protrusions. Trails in this area would remain open to hikers and equestrians. The difficulty level of this classification and the area's remoteness results in very low trail use intensity. Few visitors have identified special places here. Manning Camp and other campgrounds are reached only via trail on foot or by horseback (NPS 2008c). Less than 3% of park visitors engage in backcountry camping at the park, and there has been no more demand for camping opportunities. No specific visitor conflict or safety issues (other than erosion, which occurs throughout the district) have been identified in this area.

Under the no action alternative, no trails would be restored, and no new trails would be constructed in the Manning Camp Planning Area. The type of use allowed would not change. User capacity is not likely to exceed Primitive Zone standards as demand for access to the Manning Camp Planning Area would not likely change. The park has some safety concerns in this area, such as large washouts and trail flooding. Although park staff repair such trail damage, trails that are subject to flooding would not be redesigned or rerouted. This area would not benefit from the guidance of a formal trails plan, but given the low level of visitation, impacts, such as ongoing damage resulting from erosion, would be barely detectable. Resulting effects would be adverse, localized, long-term, and negligible.

### *Southern Boundary Planning Area*

The Southern Boundary Planning Area is zoned Primitive to the north and Natural along the Hope Camp corridor. The Hope Camp corridor, being a Natural Zone, allows trail types A through C, ranging from hardened surfaces for ADA compliance to light to moderate use by visitors with intermediate to high skill levels. Like the Manning Camp Planning Area, the Southern Boundary Planning Area experiences very low trail use intensity, and few special places have been identified here. Trails are open to hikers and equestrians.

Visitor use may increase as a result of relocation of the Arizona Trail, which would terminate outside the park near the southern boundary. The park has received comments requesting regional trail connections in the southern area. Under the no action alternative, a new route within the park connecting to the Arizona Trail would not be considered, potentially resulting in creation of social trails and illegal camping areas by visitors attempting to continue farther into the park. As a result, visitors may become lost or injured from walking off-trail, with potentially serious impacts on safety, particularly to visitors with minimal route-finding skills for this Class C area requires intermediate to high skill levels. For this reason, impacts on visitor use and safety would be detectable although few visitors would be affected. Impacts would therefore be adverse, localized, long-term, and minor.

### *Cactus Forest Planning Area*

The trails in this area are zoned Natural, Semi-primitive, and Primitive, allowing trail types A through C. With the exception of the Tanque Verde Ridge Trail, which is in the Foothills and Mountains Planning Area, all of this district's most intensely used trails are located in the Cactus Forest, particularly the Douglas Spring, Shantz, and Pink Hill trails. Visitors have indicated that nearly all of this district's "special places" are in this area, with Bridal Wreath Falls, just off the Douglas Spring Trail, ranking the

highest. Trailheads that receive the highest use are Douglas Spring, Broadway, and Wild Horse, which correlates with high intensity trail use in this area. All trails in this area permit hiking and equestrian use, and one multiuse trail (the Cactus Forest Trail) also allows mountain biking.

Compared to the TMD, this district receives a higher number of repeat visitors and is more often a primary destination for visitors, who concentrate in the Cactus Forest Planning Area. The RMD also includes substantially more miles of trails than the TMD. Many visitors and neighbors commented on the high frequency with which they use the park due to its convenience and accessibility. This often leads to crowding and associated impacts on resources, such as the creation of social trails and high levels of erosion, in the Cactus Forest Planning Area.

Under the no action alternative, many redundant, and maintenance-dependent trails (resulting from intense use) in this area would remain. The widened and braided trails that have resulted from poor design and high use would not be redesigned or rerouted, and use of social trails would continue to cause erosion and associated problems, such as deep gullies within trail beds. The public has expressed concern about overuse of the park and rated “visitor-created trails” as the second highest problem. As described in “Chapter 3: Affected Environment,” many visitors and neighbors support educating visitors on the impacts of off-trail travel and of closing social trails. Under this alternative, concerns about overuse of the park would not be addressed. Although eventually all social trails would be closed and would thus limit visitor access, visitors would likely form new social trails again. Although it is easier and more effective to prevent impacts such as shortcutting with proper trail design, which can encourage visitor behavior through subtleties of design, rather than education programs or regulations (FHWA 1994), under the no action alternative, proper trail design to address these issues would not occur. The park would not evaluate or develop more properly designed trails that could better handle the high intensity of use that currently exists and would be expected to continue in the area.

Visitors have also demanded increased access to some sites as well as access from surrounding residential areas. Some visitors also want more variety of use although some want to restrict additional types of use. Some have requested increased interpretation of cultural resources, more guided walks, and more signs. Under the no action alternative, no new trails or trail use opportunities would be provided.

Conflict is an issue in the Cactus Forest Planning Area. Conflict results from an increase in demand for trail resources, increased use of existing limited trails, poor management, underdesigned facilities, lack of user etiquette, and disregard for varying abilities of trail users (FHWA 1994). These conditions currently exist in the Cactus Forest Planning Area and would continue to do so under the no action alternative. With increased use expected from increased future visitation, conflicts and associated safety issues may escalate as more people become concentrated in this densely used area. Conflicts currently exist between different types of trail users, and some visitors have expressed dislike for horses and bicycles (despite seldom encountering any cyclists) on park trails. Some people have suggested more loop trails and single-use trails to alleviate conflicts. Under this alternative, the park would not address increased demand or use of limited resources by evaluating trails for different types of use, such as designating some trails as hiker only. Without a maintenance or education plan, management would be inadequate, and conflicts between trail users would continue.

Some of the park’s trails present safety hazards, such as steep slopes and debris on trails. Lack of proper trail maintenance also leads to unsafe trail conditions, such as trenches caused by erosion. The rock steps in this area, which some hikers and equestrians regard as a safety issue, would remain. No additional signs or education would be provided to help visitors navigate through this area, with its confusing amount of intertwined trails and junctions. Trailheads in this area post trail maps on display boards and paper maps are available in the visitor center, but no paper maps are provided for visitors to take as they use the trails. Educational exhibits and signs received the highest percentage of “add more” from the 2003–04 survey respondents — 28.6%. Proper trail design, layout, and maintenance (or redesign and

reconstruction when necessary), which are essential for user safety and are important contributors to user satisfaction (FHWA 1994), would not occur under this alternative.

Although many visitors and neighbors prefer leaving the trail system in its current condition, overall impacts of the no action alternative would be primarily adverse for the reasons described above. Impacts related to visitor use, such as loss of social trails and creation of new social trails to access desired locations, as well as conflicts between different users or groups, would be readily apparent, particularly at crowded trailheads and between different types of trail users. Many visitors would be affected by continuation of current conditions and have expressed, and would continue to express, their opinions about the effects. Therefore, adverse impacts would be specific to the Cactus Forest Planning Area, long-term, and moderate.

### *Foothills and Mountains Planning Area*

Trails in the Foothills and Mountains Planning Area are zoned Primitive with a user capacity of typically no more than seven groups encountered per day along designated trails. Trail Class C, as described for the Manning Camp Planning Area, applies here as well. Trails in this area are open to hikers and equestrians with the exception of the Tanque Verde Ridge Trail. Because this trail is closed to equestrians, and given the low levels of use in this planning area, conflicts between different types of users do not exist.

The Douglas Spring Trail, which originates in the Cactus Forest Planning Area and extends into the Manning Camp Planning Area, is one of the highest used trails in the park and the Foothills and Mountains Planning Area. While most use is concentrated in the Cactus Forest Planning Area for day hiking, the Douglas Spring Camping Area was identified by visitors as a “special place” that receives high numbers of visitors. As visitation is expected to increase along with increases in population in the Tucson area, use of this popular trail may also increase. High trail use also occurs along the Tanque Verde Ridge Trail, which visitors can use to create a long loop with the Douglas Spring Trail. Fewer visitors have identified special places along Tanque Verde Ridge Trail although some do exist. The remainder of the Foothills and Mountains Planning Area receives very little trail use.

Under the no action alternative, no new trails would be constructed in this area. The type of use allowed would not change. User capacity could exceed Primitive Zone standards if use intensified along the Douglas Spring and Tanque Verde Ridge trails. This area would not benefit from the guidance of a formal trails plan, particularly in high use areas. Impacts on visitor use, conflicts, or visitor experience may be detectable, but would be slight. Resulting effects would be adverse, localized, long-term, and minor.

### *Access Points and Trailheads*

Several visitors and neighbors desire additional access points although a majority feels that more entry points are not needed. However, at Cactus Forest there is a need to improve access at Broadway and Speedway parking areas where insufficient and poorly located parking has created safety problems. Inappropriate speed limits and incompatible use (such as horse trailers parking where hikers park) also create safety issues, which would likely worsen with increased visitation. Under the no action alternative, access and parking would not be addressed, resulting in ongoing conflicts and safety issues, particularly along Broadway and Speedway boulevards. Impacts would be adverse, localized (primarily specific to the Cactus Forest Planning Area), long-term, and minor to moderate, as conflicts would be slight to readily apparent.

### *Cumulative Impacts*

The past, present, and reasonably foreseeable future actions with potential to affect visitor use are related primarily to encroaching development around the park. The post-war population boom led to extensive urban and rural development that is continuing today and is not expected to wane; Tucson is expected to grow from 486,700 in 2000 to 595,800 in 2010. Park lands have become islands in a human-manipulated environment. Pima County has experienced a 23% growth in housing units since 1990, which is double

that of Tucson (14.3%). The increased development has resulted in a loss of equestrian opportunities. Several local area plans address future residential development, including new development near the park's boundaries, particularly the *Houghton Area Master Plan* and the *Rincon/Southeast Subregional Plan*. These plans are expected to bring development close to the park's southwestern and southern boundaries, respectively. Because of external threats, the park has erected a boundary fence to help prevent illegal off-road use and cattle entering the park.

Despite this encroaching development, some other land use areas provide regional recreational opportunities, including Tucson Mountain Park, Ironwood National Monument, Coronado National Forest, Las Cinegas National Conservation Area, and Catalina State Park. Resource Management plans and other actions undertaken in these areas would help preserve them and provide outdoor recreational opportunities in the region. However, these areas are also likely experiencing the same visitor use pressure as Saguaro, which would continue as development and regional population increases.

Slight beneficial effects would result from some actions within the RMD, such as improvements to visitor facilities (including new trails) in the Javelina Picnic Area and improvements to Cactus Forest Drive, with resulting safety benefits. Park staff would also perform minor trail re-routes in both districts on an as-needed basis. The parkwide sign plan would provide visitors information in the park's frontcountry and backcountry based on a sign condition assessment of all existing signs, a determination of needs, a removal plan, and a location plan. This would aid with way finding, which would help minimize confrontation and improve safety.

Slight adverse impacts would result from damage to trails, structures, and signs; and possible trail closures that could be expected under implementation of the park's FMP, particularly in the Manning Camp Planning Area, where the Bonita Trail is used as a firebreak. However, these actions would make a small overall contribution to cumulative impacts compared to the effects of increased development.

Impacts of the actions described above, particularly development, would have an overall adverse regional long-term moderate impact on visitor use, as these impacts have been, and would continue to be, readily apparent. When combined with the no action alternative's primarily adverse impacts due to lack of proper trails planning and design, cumulative impacts would be adverse, regional, long-term, and moderate. The no action alternative would provide a small incremental impact to overall cumulative impacts.

#### *Conclusion*

Under the no action alternative, all washes throughout the RMD would be closed to trail use, resulting in primarily adverse district-wide long-term moderate impacts. Impacts at the Manning Camp Planning Area would be adverse, localized, long-term, and negligible due to low levels of visitor use. At the Southern Boundary Planning Area, impacts would be adverse, localized, long-term, and minor, primarily as a result of potential effects associated with the Arizona Trail. Visitors to the Cactus Forest Planning Area, with its high intensity of use, would experience adverse impacts that would be localized, long-term, and moderate. Impacts at the Foothills and Mountains Planning Area would be adverse, localized, long-term, and minor, related mostly to the Douglas Spring and Tanque Verde Ridge trails. Under the no action alternative, access and parking would not be addressed, resulting in ongoing conflicts and safety issues, particularly along Broadway and Speedway boulevards. Impacts related to access points and trailheads would be adverse, localized, long-term, and minor to moderate. Cumulative impacts would be adverse, regional, long-term, and moderate, primarily related to encroaching development.

### Tucson Mountain District

The TMD contains four distinct planning areas; Northeast Corner, Northwest, South Central, and East Boundary. Some washes in this district have already been designated as trails and would remain so. Under the no action alternative, no new washes would be designated and all remaining washes throughout the district would be closed to trail use. Social trails would continue to develop adjacent to wash banks, resulting in adverse district-wide long-term minor impacts related to washes. This would occur in all

planning areas, resulting in a primarily adverse impact, for most visitors would view this as losing trails although some visitors may view closure and restoration of washes as a benefit to the natural conditions that comprise their park experience. Impacts related to wash closures would be primarily adverse, district-wide, long-term, and moderate, as the effect would be readily apparent, and many visitors would likely express an opinion about it. Insufficient education about impacts of social trails and visitor-induced resource damage, as well as an insufficient number of signs, would have adverse long-term minor impacts district-wide. Remaining actions under the no action alternative would affect visitor use and experience in each of the planning areas as follows:

### *Northeast Corner Planning Area*

No official trails exist in this area, and none are planned under the no action alternative. Washes would not be evaluated for suitability as trails. All social trails would eventually be closed. Access to state land located within this area is not possible without a permit; no trails access the state parcel. A continued lack of trail routes in this area would be readily apparent, resulting in an adverse localized long-term moderate impact.

### *Northwest Planning Area*

The majority of the Northwest Planning Area is zoned Primitive (which allows for trail type C as described previously), except for the area near the CCC camp, which is zoned Natural and allows for hardened surfaces. This planning area receives very low intensity of use. No official trails exist to the CCC camp in this area, and none would be developed. The number of social trails leading to the camp indicates a desire by visitors to access the site. During public scoping for the 2007 GMP, the public suggested increased interpretation of cultural resources. Under the no action alternative, these social trails would be closed, and visitors would not be able to access the camp.

Wasson Peak, located in the South Central Planning Area, is by far the highest ranked “special place” in the TMD, possibly indicating a desire on the part of visitors to access the park’s peaks. Visitors have noted that enjoying the park’s natural scenery and views is of primary importance. In the Northwest Planning Area, no trails exist to Panther and Safford Peaks, and none would be developed, possibly depriving visitors of another opportunity to enjoy the district’s scenery and views. As noted under the RMD, visitors and neighbors have been demanding increased access to some attraction sites, which has led to an increase in social trails and related safety issues. Although the park plans to close all social trails in this district, these trails would likely form again as long as the attraction remains — a slightly detectable impact. A continued lack of trail routes to attraction sites would result in an adverse localized long-term minor impact.

### *East Boundary Planning Area*

Trails in the East Boundary Planning Area are zoned Primitive or Semi-primitive, allowing trail Class B and C. Few official trails exist in this area, and no new trails would be developed. Trail use would be limited to the Camino del Cerro trailhead. Like the other planning areas, this area receives very low intensity of use. However, visitors have indicated a desire to see some attractions in this area, such as old mines and a particular cristate, or crested, saguaro. Trails to such attractions would not be developed under the no action alternative. As noted above, a desire for access to some attraction sites has led to an increase in social trails, which may continue to form despite closures, thereby resulting in safety issues, resulting in a slightly detectable change. A continued lack of trail routes to attraction sites would be an adverse localized long-term minor impact.

### *South Central Planning Area*

This planning area includes the highest intensity of visitor use and essentially all of this district’s special places that have been identified by visitors. The majority is zoned Primitive (Class C), with the exception of those areas near developed sites, such as the Mam-A-Gah Picnic Area, which is zoned Semi-primitive

(Class B). Under this alternative, certain trails and picnic areas would remain closed to horse use. No new trails or trail connections would be developed. Because so few trails exist in other planning areas, and those that do receive little use due to insufficient access points, use would continue to be concentrated in this planning area, resulting in potential crowded conditions and possible conflicts, particularly if visitation increases. Impacts due to lack of signs would be most prominent in the South Central Planning Area given the high intensity of use. Golden Gate Road would be closed to motor vehicle access and converted to a multiuse trail, resulting in a beneficial impact on visitor use, as hikers, bikers, and equestrians would be able to use this corridor without interference from motor vehicles. This road would likely be wide enough to reduce potential for conflicts resulting from multiple use. For this reason, impacts in the South Central Planning Area are likely to be primarily beneficial, localized, long-term, and minor, for the effect would be detectable although few visitors would be affected given trail use intensity distribution.

### *Access Points and Trailheads*

As with the RMD, several visitors and neighbors desire additional access points although a majority feels that more entry points are not needed. Under the no action alternative, existing access points and trailheads would remain. Unofficial access points would be closed, and no new access would be formalized. There would continue to be a lack of access for equestrians in the Northwest Planning Area. Pima County would move the trailhead, which would improve sight distance at the Kings Canyon trailhead; this would improve safety. In general, a lack of sufficient formal access would be a detectable change, ranging from slight to readily apparent. Under the no action alternative, impacts would be adverse, district-wide, long-term, and minor to moderate.

### *Cumulative Impacts*

The same general scenario of past, present, and reasonably foreseeable future actions that apply to the RMD would also apply to the TMD, particularly encroaching development. Recent development has resulted in residential areas abutting the park's northeast and western boundaries in particular. The use of Picture Rocks Road as a commuter corridor through the park to reach these developments also affects visitor use and experience in the TMD, particularly safety. Several local area plans address future residential development, including new development near the park's boundaries, particularly the *Tucson Mountains Subregional Plan*. This plan would further affect development on the east, south, and west sides of the TMD. As a result of encroaching development, the park has erected a boundary fence to help prevent illegal off-road use from entering the park.

As described under the RMD section, some other land use areas provide regional recreational opportunities. Resource management plans and other actions undertaken in these areas would help preserve them and provide outdoor recreational opportunities in the region. However, these areas are also likely experiencing the same visitor use pressure as Saguaro, which would continue as development and regional population increases.

Park staff would also perform minor trail re-routes in both districts on an as-needed basis.

Impacts of the actions described above, particularly development, would have an overall adverse regional long-term moderate impact on visitor use, for these impacts have been, and would continue to be, readily apparent. When combined with the no action alternative's primarily adverse impacts due to lack of proper trails planning and design, cumulative impacts would be adverse, regional, long-term, and moderate. The no action alternative would provide a small incremental impact to overall cumulative impacts.

### *Conclusion*

Under the no action alternative, impacts related to wash closures would be primarily adverse, district-wide, long-term, and moderate. Insufficient education about impacts of social trails and visitor-induced resource damage, as well as an insufficient number of signs, would have adverse long-term minor impacts

district-wide. A continued lack of trail routes in the Northeast Corner Planning Area would be an adverse localized long-term moderate impact. Similarly, in the Northwest and East Boundary planning areas, a continued lack of trail routes to attraction sites would be an adverse localized long-term minor impact. Golden Gate Road would be closed to motor vehicle access and converted to a multiuse trail, resulting in a beneficial localized long-term minor impact in the South Central Planning Area. A lack of sufficient formal access would be an adverse district-wide long-term minor to moderate impact. Cumulative impacts would be adverse, regional, long-term, and moderate.

## Rincon Mountain District

### Alternative A Analysis

Elements of the no action alternative, such as zoning and trail classifications, would apply to all action alternatives, unless otherwise noted. Alternative A would affect visitor use and experience in each of the planning areas as follows:

#### *Manning Camp Planning Area*

Under alternative A, the Bonita Trail would be removed and restored to natural conditions. This is a redundant trail as other nearby trails provide similar access. Very few visitors use the trails in this part of the park, so intensity of use is very low. Therefore, removing and restoring a redundant trail would have little adverse impact on park visitors. Few visitors would be affected by this barely detectable change. Slightly beneficial impacts would result from restoring natural conditions, thus improving the visitor experience of a natural environment. Impacts on visitor use and experience would be primarily adverse, localized, long-term, and negligible.

#### *Southern Boundary Planning Area including the Arizona Trail*

Under alternative A, the Hope Camp Trail (which currently allows hikers and equestrians) would be converted to multiuse, and the eastern end of the trail would be extended to the southern park boundary where a new access point would be located. The Hope Camp Trail is zoned Natural, with no more than 45 people encountered per hour along designated trails. The conversion of this trail to multiuse would provide more trail use opportunities and improve the visitor experience for those people who want to use bicycles in the park. However, other visitors have indicated a desire for less bicycle use at Saguaro. Closing and restoring the North Hope Camp Trail would remove a trail from use, resulting in a slightly adverse impact.

The Arizona Trail would connect to the Hope Camp Trail and continue 4.2 miles northeast within the park to connect with the Manning Camp Trail. Adding a new connecting trail segment would be a beneficial impact and would reduce or eliminate the number of social trails at this location that would be expected under the no action alternative. Providing connectivity to the Arizona Trail would greatly increase use of that trail and the Hope and Manning trails. Although the Southern Boundary Planning Area receives few visitors, and trail use intensity is very low, creating a new access point, allowing bicycle use, removing the North Hope Camp Trail, and creating a connection to the Arizona Trail would result in more concentrated and varied use with the potential for more user conflicts.

Arizona Trail through-hikers would have to travel a long distance from the park boundary to the first official camping area within the park. These hikers would need a NPS camping permit, which can be obtained in advance online. With increased use in this area, illegal camping outside of officially designated campsites could occur, especially near Madrona. Camping outside the park boundary would be encouraged to reduce the chances of illegal camping within the park. Through-hikers would need to be prepared to travel far distances through the park without access to water. Unprepared through-hikers could experience health or safety issues related to having to travel long distances to campsites, particularly due to lack of available water.

Long-term impacts on visitor use and experience in the Southern Boundary Planning Area would be primarily beneficial due to the addition of bicycle use and a new connection to the Arizona Trail, both of which would provide a new visitor experience. Closing the North Hope Camp Trail would be offset by the provision of new opportunities in this area. Under alternative A, impacts on visitor use and experience would be readily apparent, resulting in a primarily beneficial localized and regional (due to a new trail connecting to the Arizona Trail) long-term moderate impact.

### *Cactus Forest Planning Area*

Under alternative A, the Lime Falls Trail proposed extension would provide new interpretive access to a unique geologic feature. A new trail from the Shantz Trail to the Mica View Picnic Area would also be constructed. A new short trail segment, Ernie's Falls, would connect the Douglas Spring Trail near Bridal Wreath Falls to the park boundary and to USFS lands to the north. Ten existing trails would be removed and restored to natural conditions. Three washes would be designated as trails; all others would be closed to trail use. All new designated trails would allow hikers and equestrians.

Mountain bikers would experience no change compared to the no action alternative. Hikers and equestrians would be equally impacted by the addition and removal of trails proposed under alternative A. Repeat visitors, such as park neighbors, would likely be most affected as they are more familiar with existing trails than first-time or infrequent visitors.

The overall effect would result in concentrating visitor use rather than dispersing it among several trails within a dense trail network. Conflicts could increase because users would be more concentrated on fewer trails. Closing and restoring redundant trails and washes would improve natural conditions and the visitor experience for those who have expressed concern that overuse is threatening the park's qualities of solitude and naturalness (addressed in more detail in the "Wilderness" section of this chapter). However, many visitors and neighbors are concerned about reductions in recreation opportunities, specifically trail closures. Despite this concern, access to all "special places" identified by visitors would remain. Reducing the number of redundant trails in the Cactus Forest Planning Area would improve way finding and safety, as some people have expressed difficulty with way finding in this area.

Many visitors and neighbors support educating visitors on the impacts of off-trail travel. Under alternative A and all action alternatives, NPS staff and volunteers would educate park users upon implementation of this plan. This may require providing additional park staff at trailheads to help visitors adjust to and recognize the need for the new plan and to help them with way finding.

Because visitors engage in different activities for different reasons and participate in the same activities for different reasons, they use recreational environments in different ways to achieve their desired experiences (Hammitt and Cole 1998). This alternative would satisfy those visitors who are primarily concerned with preserving natural conditions, for it would remove and restore the most existing trails. Visitors and neighbors who are primarily concerned with retaining and/or adding as many recreational opportunities as possible would not be satisfied. Therefore, impacts on visitor use and experience would be both beneficial and adverse, depending on the individual. To some visitors, the changes proposed under this alternative would be slightly detectable; to others, the changes would be readily apparent. The resulting beneficial and adverse impacts would be localized, long-term, and range from minor to moderate, depending on the individual's past experience, goals, and expectations.

### *Foothills and Mountains Planning Area*

Under alternative A, no change would occur compared to the no action alternative. Impacts would be adverse, localized, long-term, and minor.

### *Access Points and Trailheads*

Unlike the TMD, the RMD is mostly surrounded by national forest. Under alternative A, a new access point at the Ernie's Falls Trail would allow travel between USFS and NPS lands. Adding new access at

the southern boundary would increase use in that area. Relocating the Irvington access would improve safety by increasing sight distance at the Foothills and Mountains Planning Area. Alternative A would address the safety issues related to parking at the trailheads along Broadway and Speedway boulevards. Redesigned and improved parking at the Douglas Spring/Wildhorse trailhead, the Cactus Forest trailhead, and the Loma Alta trailhead would help improve safety. Horse trailer parking and car parking would be designed to reduce conflicts. Overall, impacts would be beneficial, localized, long-term, and moderate, as these changes would be readily apparent and would affect many visitors.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to alternative A, with some differences in certain areas. In the Southern Boundary Planning Area, new development proposed under the *Rincon/Southeast Subregional Plan*, combined with new access into the park and new recreational opportunities (converting the Hope Camp Trail to multiuse and providing a connection to the Arizona Trail) would likely increase visitor use in this area. Trail use intensity in this area is already low, so cumulative impacts related to conflicts and safety would be adverse and detectable, ranging from slight to readily apparent — a minor to moderate effect. However, combining increased access and new trail opportunities with increasing development would be a beneficial regional long-term minor impact on visitor use and experience.

Adding new trails under alternative A and a new access point at Ernie's Falls in the Cactus Forest Planning Area, which would provide connectivity between Saguaro National Park and Coronado National Forest, together would result in more recreational opportunities — a slight beneficial impact on visitors. The minor trail reroutes the park would undertake under a categorical exclusion would be more effective and detectable when combined with alternative A's specific plans for the redundant trails, washes, and social trails in the Cactus Forest Planning Area compared to the no action alternative. The result would be a beneficial effect, particularly to safety as trails may be rerouted around heavily eroded areas.

The parkwide sign plan, when combined with the changes to trail routes under alternative A, would help educate visitors about the changes implemented under this, and all, action alternatives. As under the no action alternative, this would aid with way finding — to a greater extent than under the no action alternative — which would help minimize confrontation and improve safety.

Compared to the cumulative impacts expected under the no action alternative, the differences under alternative A would be so small in relation to the past, present, and future effects of encroaching development as to result in no measurable difference. Cumulative impacts under alternative A would be primarily adverse, regional, long-term, and moderate. This alternative would provide a small incremental impact to overall cumulative impacts.

### *Conclusion*

Approximately 6 mile of trails would be added district-wide in alternative A (13.1 miles would be added and 7.20 would be removed). Therefore, there would be little change in overall trail mileage compared to current conditions, which would satisfy a large percentage (64.4%) of visitors and neighbors who want to leave the hiking trails "as is." Under alternative A, removing and restoring the Bonita Trail in the Manning Camp Planning Area would result in primarily adverse localized long-term negligible impacts on visitor use and experience. In the Southern Boundary Planning Area, the addition of bicycle use and a new connection to the Arizona Trail would result in a beneficial localized and regional (due to the Arizona Trail connection) long-term moderate impact. The majority of changes to visitor use and experience would occur at the Cactus Forest Planning Area, where some new trails and designated washes would be added, and 10 trails would be removed and restored to natural conditions. Impacts would be both beneficial and adverse, localized, long-term, and minor to moderate, depending on the individual. In the Foothills and Mountains Planning Area, no change would occur compared to the no action alternative. Impacts would be adverse, localized, long-term, and minor. Improved access and parking at trailheads,

specifically at the Cactus Forest Planning Area, would be beneficial, localized, long-term, and moderate. Cumulative impacts would be beneficial and adverse, regional, long-term, and moderate.

### Alternative B Analysis

Alternative B would affect visitor use and experience in each of the planning areas as follows:

#### *Manning Camp Planning Area*

Under alternative B, there would be no change compared to the no action alternative. Impacts would be adverse, localized, long-term, and negligible.

#### *Southern Boundary Planning Area*

Unlike alternative A, bicycles would not be allowed on the Hope Camp Trail, and the North Hope Camp Trail would not be removed and restored to natural conditions under alternative B. Therefore, there would be no change compared to baseline conditions (the no action alternative), with the exception of two new trails and associated access points proposed for this area, which would likely offer more recreational opportunities and increase visitor use. Under alternative B, the Arizona Trail would enter the park on its western boundary to connect to the Tanque Verde Ridge Trail, which is in the Foothills and Mountains Planning Area (addressed below). The social trails expected under the no action alternative relative to termination of the Arizona Trail at the southern boundary would not apply. Therefore, long-term impacts of alternative B would be beneficial and barely detectable, resulting in localized negligible effects on the Southern Boundary Planning Area.

#### *Cactus Forest Planning Area*

Under alternative B, a hiker only trail would loop around Javalina Rocks and Javelina Wash, and two of its tributaries would be designated as official trails. Fewer trails (6) would be removed and restored to natural conditions compared to alternative A. Impacts of doing so would be similar to alternative A, but to a lesser extent because fewer trails would be restored. The Ernie's Falls Trail and access would be developed as under alternative A. The Carillo and Garwood trails would be converted to hiker only trails.

Mountain bikers would perceive more adverse impacts under alternative B compared to the no action alternative. Equestrians, who represent 7.8% of all park visitors, would lose access to two trails. However, this change would reduce conflicts between user types on these trails, resulting in a beneficial impact on conflicts and safety. As noted in "Chapter 3: Affected Environment," the majority of comments regarding user group conflicts on trails came from survey respondents in the RMD, who noted their dislike for horse manure on trails and ranked horseback riders high in the "disliked them" category. Some respondents suggested single-use trails to alleviate user group conflicts. Because the vast majority of equestrians are park neighbors, they would be more impacted compared to first-time or infrequent equestrian visitors.

Access to all "special places" identified by visitors would remain under alternative B. Improving natural conditions would be perceived as a benefit by those visitors who are concerned about overuse. As under alternative A, concentrating visitor use, rather than dispersing it, could lead to increased conflicts although to a lesser extent because fewer trails would be removed and restored. Also, reducing the number of redundant trails would improve way finding and safety.

As with alternative A, alternative B would satisfy those visitors who are primarily concerned with preserving natural conditions, but fewer trails would be removed and restored. Visitors and neighbors who are concerned with retaining and/or adding as many recreational opportunities as possible would not be satisfied although they would likely perceive alternative B as preferable to alternative A. Neighboring equestrians would perceive more adverse impacts on their experience under alternative B. Therefore, impacts on visitor use would be both beneficial and adverse. To some visitors, these changes would be slightly detectable; to others, the changes would be readily apparent. The resulting beneficial and adverse impacts would be localized, long-term, and minor to moderate, depending on the individual.

### *Foothills and Mountains Planning Area*

Under alternative B, there would be no change compared to the no action alternative with the exception that the Arizona Trail would enter the park in this area. Under alternative B, Arizona Trail users would connect with the existing Tanque Verde Ridge Trail on the park's western boundary — a beneficial impact resulting from a regional trail connection. Unlike under alternative A, a new trail would not be created to provide access into the park. Use of the Tanque Verde Ridge Trail would increase although conflicts are not likely to increase because this trail would remain hiker only. The change would be detectable but slight. As under alternative A, through-hikers would have to travel far into the park before encountering a legal campsite; therefore, illegal camping could occur along the Tanque Verde Ridge Trail. Lack of sufficient water supply could also affect the health and safety of inexperienced through-hikers. Overall, impacts under alternative B would be adverse, localized, long-term, and minor for reasons described under alternative A, with mostly beneficial regional long-term minor impacts related to use of the Tanque Verde Ridge Trail to connect to the Arizona Trail.

### *Access Points and Trailheads*

The three new access points and one trailhead proposed under alternative B would provide more options for accessing park trails in the Cactus Forest and Southern Boundary planning areas, resulting in a beneficial impact. The same parking changes described under alternative A would also apply to alternative B. Overall, impacts would be beneficial, localized, long-term, and moderate, for these effects would be readily apparent.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to alternative B, with similar differences as described under alternative A. In the Southern Boundary Planning Area, new development proposed under the *Rincon/Southeast Subregional Plan* would combine with new access points in this area. The recreational opportunities described for alternative A (multiuse trail and Arizona Trail connection) would not be provided under alternative B, but new access points would likely increase visitor use in this area. Trail use intensity in this area is already low, so cumulative impacts related to conflicts and safety would be adverse and slightly detectable, resulting in a minor effect. However, providing increased access and new trail opportunities to an increasing local population would be a beneficial regional long-term moderate impact on visitor use and experience.

Similar impacts on the Cactus Forest Planning Area would apply as a result of new trails, the new access point to USFS lands to the north, and the minor trail reroutes that would combine with other actions in the area. The parkwide sign plan, when combined with the changes to trail routes under this alternative, would help educate visitors about the new changes and would aid with way finding and improve safety. The result of these actions would be a beneficial effect.

As in alternative A, under alternative B, these differences would be so small in relation to the past, present, and future effects of encroaching development as to result in no measurable difference from current conditions. Cumulative impacts would be adverse, regional, long-term, and moderate. Alternative B would provide a small incremental impact to overall cumulative impacts.

### *Conclusion*

Despite losing access to some trails in the Cactus Forest Planning Area, a total of 10.4 new miles of trails would be added district-wide compared to 4.3 miles that would be removed, resulting in a gain of 6.1 miles over existing conditions. Nearly 16% of park visitors and neighbors want to add more hiking trails in this district. In the Manning Camp Planning Area, there would be no change compared to the no action alternative; impacts under alternative B would be adverse, localized, long-term, and negligible. Impacts in the Southern Boundary Planning Area would be beneficial, localized, long-term, and negligible primarily

due to additional recreational opportunities. In the Cactus Forest Planning Area, some new trails would be added, and fewer trails would be removed compared to alternative A. Two existing trails would be converted to hiker only; impacts would be both beneficial and adverse, localized, long-term, and minor to moderate, depending on the individual. At the Foothills and Mountains Planning Area, impacts would be adverse, localized, long-term, and minor for reasons described under alternative A, with mostly beneficial regional long-term minor impacts related to the use of the Tanque Verde Ridge Trail to connect to the Arizona Trail. Overall, under alternative B, impacts on access points and trailheads would be beneficial, localized, long-term, and moderate. Cumulative impacts would be adverse, regional, long-term, and moderate.

### Alternative C Analysis

Alternative C would affect visitor use and experience in each of the planning areas as follows:

#### *Manning Camp Planning Area*

Under alternative C, there would be no change compared to alternative A. Impacts would be adverse, localized, long-term, and negligible.

#### *Southern Boundary Planning Area*

The trail configuration for alternative C would be the same as the trail configuration in alternative B, which would likely offer more recreational opportunities and increase visitor use. Impacts would be beneficial, site-specific, localized and negligible. Unlike alternative B, under alternative C, bicycles would be allowed on Hope Camp Trail and the North Hope Camp Trail would be removed and restored. The conversion of Hope Camp Trail to multiuse would provide more trail use opportunities and improve the visitor experience for those people who want to use bicycles in the park. However, other visitors have indicated a desire for less bicycle use at Saguaro. Closing and restoring the North Hope Camp Trail would remove a trail from use, resulting in a slight adverse impact.

The Arizona Trail alignment under alternative C would be the same as described for alternative A. Impacts associated with the alignment of the Arizona Trails would be beneficial, localized and regional, long term, and moderate.

Overall, under alternative C, the long-term impacts on visitor use and experience in the Southern Boundary Planning Area would be primarily beneficial due to the addition of bicycle use and a new connection to the Arizona Trail, both of which would provide a new visitor experience. Closing the North Hope Camp Trail would be offset by the provision of new opportunities in this area. Impacts on visitor use and experience would be readily apparent, resulting in a primarily beneficial localized and regional (due to a new trail connecting to the Arizona Trail) long-term moderate impact.

#### *Cactus Forest Planning Area*

Under alternative C, a new multiuse trail would be constructed from Old Spanish Trail near Escalante Road to the Cactus Forest Trail. This new trail would provide a connection to a multiuse trail, more trail use opportunities, and a better visitor experience for those people who want to use bicycles in the park. However, other visitors have indicated a desire for less bicycle use at Saguaro. Like alternative B, under alternative C, a hiker only trail would be constructed around Javelina Rocks and would be accessed by Cactus Forest Loop Drive. In addition, a new trail originating at the proposed Freeman Road access would connect with the Shantz Trail, which would provide more access to the RMD. Similar to alternative B, Javelina Wash and its two tributaries south of the Cactus Forest Loop Drive would be designated as official trails. In addition, Loma Verde Wash, Monument Wash, Deer Valley Wash, and Bajada Wash would also be designated as official trails. The washes designated as trails would allow both hikers and equestrians, and thus, would enhance visitor experience and opportunities. Nine existing trails would be removed and restored under alternative C. Impacts from removing redundant trails in Cactus Forest Planning Area would be similar to alternative A.

Mountain bikers would benefit from the new connection to Cactus Forest Trail. Hikers and equestrians would both be impacted by the addition and removal of trails proposed under alternative C, but only hikers would benefit from the new trail constructed around Javelina Rocks. Repeat visitors, such as park neighbors, would likely be most affected as they are more familiar with existing trails than first-time or infrequent visitors.

Access to all “special places” identified by visitors would remain. Improving natural conditions would be perceived as a benefit by those visitors concerned about overuse. As under alternative A, under alternative C, concentrating visitor use, rather than dispersing it, could lead to increased conflicts. Also, reducing the number of redundant trails would improve way finding and safety.

As with alternative A, alternative C would satisfy those visitors who are primarily concerned with preserving natural conditions. Visitors and neighbors who are concerned with retaining and/or adding as many recreational opportunities as possible would not be satisfied though they would likely perceive alternative C as preferable to either alternative A or B. Additional access points would provide more access to include bike access to the park, and the designation of additional washes as trails would benefit equestrians. Therefore, impacts on visitor use would be both beneficial and adverse. To some visitors, these changes would be slightly detectable; to others, the changes would be readily apparent. The resulting beneficial and adverse impacts would be localized, long-term, and minor to moderate, depending on the individual.

### *Foothills and Mountains Planning Area*

Under alternative C, there would be no change compared to the no action alternative. Impacts would be adverse, localized, long-term, and minor.

### *Access Points and Trailheads*

The three access points and trailheads proposed for alternative B would also occur under alternative C, resulting in a beneficial impact. The same parking changes described under alternative A would also apply to alternative C. In addition, a proposed access point along the northern boundary, at the intersection of Speedway and Wentworth; an access point along Freeman Road, which would connect to the Shantz Trail via a new trail; and an access point along the western boundary at the intersection of Old Spanish Trail (Irvington) at Shurban Wash would further provide more options for accessing park trails in the Cactus Forest and Southern Boundary planning areas. Overall, impacts would be beneficial, localized, long-term, and moderate, for these effects would be readily apparent.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to alternative C, with similar differences as described under alternative A. In the Southern Boundary Planning Area, new development proposed under the *Rincon/Southeast Subregional Plan* would combine with new access points in this area. The recreational opportunities described for alternative A (multiuse trail and Arizona Trail connection) would be provided under alternative C. Six new access points would likely increase visitor use in this area. Providing increased access and new trail opportunities to an increasing local population would be a beneficial regional long-term moderate impact on visitor use and experience.

Similar impacts in the Cactus Forest Planning Area would apply as a result of new trails, the new access point to USFS lands to the north, and the minor trail reroutes that would combine with other actions in the area. The parkwide sign plan, when combined with the changes to trail routes under alternative C, would help educate visitors about the new changes and would aid with way finding and improve safety. The result of these actions would be a beneficial effect. As in alternative A, under alternative C, these differences would be so small in relation to the past, present, and future effects of encroaching development as to result in no measurable difference from current conditions. Cumulative impacts would

be adverse, regional, long-term, and moderate. Alternative C would provide a small incremental impact to overall cumulative impacts.

### *Conclusion*

Despite losing access to some trails in the Cactus Forest Planning Area, a total of 26.4 new miles of trails would be added district-wide compared to 7.1 miles that would be removed, resulting in a gain of 19.3 miles over existing conditions. Nearly 16% of park visitors and neighbors want to add more hiking trails in this district. In the Manning Camp Planning Area, there would be no change under alternative C compared to the no action alternative. Impacts would be adverse, localized, long-term, and negligible. Impacts in the Southern Boundary Planning Area would be beneficial, localized and regional (due to a new trail connecting to the Arizona Trail), long-term, and moderate due to additional recreational opportunities. In the Cactus Forest Planning Area, some new trails would be added (including one multiuse and one hiker only trail), and 9 trails would be removed compared to 10 for alternative A. Impacts would be beneficial, adverse, localized, long-term, and minor to moderate, depending on the individual. At the Foothills and Mountains Planning Area, impacts would be adverse, localized, long-term, and minor for reasons described under the no action alternative. Cumulative impacts would be adverse, regional, long-term, and moderate.

## Preferred Alternative Analysis

The preferred alternative would affect visitor use and experience in each of the planning areas as follows:

### *Manning Camp Planning Area*

Under the preferred alternative, there would be no change compared to the no action alternative. Impacts would be adverse, localized, long-term, and negligible.

### *Southern Boundary Planning Area including the Arizona Trail*

Impacts under the preferred alternative would be the same as alternative C, primarily beneficial, localized and regional (due to a new trail connecting to the Arizona Trail) long-term, and moderate.

### *Cactus Forest Planning Area*

Similar to alternative B, under the preferred alternative, fewer trails (7) would be removed and restored to natural conditions compared to alternative A. Also as under alternative B, two existing trails would be converted to hiker only. Impacts of these actions would be similar to alternative B.

A portion of the Mica View Trail would be converted to an ADA challenge trail, providing a new ADA trail and recreational experience within the park. Horses would be prohibited on this portion of the trail although equestrians would be able to access the picnic area from the south. As under alternative A, under the preferred alternative, the Lime Falls Trail and its proposed extension would provide new interpretive access to a unique geologic feature.

Under the preferred alternative, impacts related to converting washes to designated trails would be similar to alternative C, with slight changes, plus an additional new wash would be added connecting the Kennedy Trail with the Shantz Trail. Converting washes to designated trails and adding a new wash would result in a beneficial effect.

Overall, impacts under the preferred alternative would be similar to alternative B for the reasons stated under that analysis. Additional beneficial impacts would result from providing an ADA challenge trail and a new interpretive trail to Lime Falls. These actions would provide access to a variety of park users and would provide access to a unique feature of the park. Although equestrians would be prohibited from the ADA challenge trail, their access would remain only slightly reduced compared to alternative B. Impacts of the preferred alternative would be beneficial, adverse, localized, long-term, and minor to moderate, depending on the individual.

### *Foothills and Mountains Planning Area*

Under the preferred alternative, there would be no change compared to the no action alternative. Impacts would be adverse, localized, long-term, and minor.

### *Access Points and Trailheads*

Under the preferred alternative, impacts related to access points and trailheads would be similar to alternative B, with slight differences, such as relocating the existing access along Wentworth Road to the north, which would result in realigning and terminating the Shantz and Vanover trails at this access point. This change would have minimal impacts on visitor use and experience. Therefore, impacts under the preferred alternative would be beneficial, localized, long-term, and moderate for the reasons described under alternative B.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to the preferred alternative, with similar differences as described under alternative A. Additional differences specific to the preferred alternative would occur in the Cactus Forest Planning Area with the conversion of the Mica View Trail to an ADA challenge trail and the conversion of two trails to hiker only.

The minor trail reroutes the park would undertake under a categorical exclusion would be more effective when combined with the preferred alternative's specific plans for the redundant trails, washes, and social trails compared to the no action alternative. The parkwide sign plan, when combined with the changes to trail routes under the preferred alternative, would help educate visitors about the new changes and would aid with way finding and improve safety. The result of these actions would be beneficial.

As in alternative B, under the preferred alternative, these differences would be so small in relation to the past, present, and future effects of encroaching development as to result in no measurable difference from current conditions. Cumulative impacts would be adverse, regional, long-term, and moderate. The preferred alternative would provide a small incremental impact to overall cumulative impacts.

### *Conclusion*

Despite losing access to some trails in the Cactus Forest Planning Area, a total of 22.6 new miles of trails would be added district-wide compared to 4.0 miles that would be removed, resulting in a gain of 18.6 miles over existing conditions. Nearly 16% of park visitors and neighbors want to add more hiking trails in this district. In the Manning Camp and the Foothills and Mountains planning areas, impacts under the preferred alternative would be the same as the no action alternative: adverse, localized, long-term, and negligible; and adverse, localized, long-term, and minor, respectively. Impacts at the Southern Boundary Planning Area would be the same as alternative C: primarily beneficial, localized and regional (due to a new trail connecting to the Arizona Trail) long-term, and moderate. In the Cactus Forest Planning Area, additional beneficial impacts would result from providing an ADA challenge trail and a new interpretive trail to Lime Falls. Overall, impacts in the Cactus Forest Planning Area would be beneficial and adverse, localized, long-term, and minor to moderate, depending on the individual. Impacts on access points and trailheads would be beneficial, localized, long-term, and moderate for the reasons described under alternative B. Cumulative impacts would be adverse, regional, long-term, and moderate.

## Tucson Mountain District

### Alternative A Analysis

Elements of the no action alternative, such as zoning and trail classifications, would apply to all action alternatives, unless otherwise noted. Alternative A would affect visitor use and experience in each of the planning areas as follows:

### *Northeast Corner Planning Area*

Relocating the trail crossing for the Ringtail Trail would provide for safer crossing conditions from the Box Canyon parking lot across Picture Rocks Road. An interior loop trail would be added in this area, with a new trailhead to the north and access point to the east. The trail would be Class C, as it would exist in a Primitive Zone, and would be constructed for light to moderate use by visitors with high to intermediate skills. This new trail and access would replace existing social trails and provide access to the state land that lies within the park in this area. Social trailing, and associated safety issues, as a result of encroaching development in this corner of the park would be reduced. A higher percentage of visitors to TMD (18.2%) indicated a desire for more trails than visitors to the RMD (15.8%), possibly due to the large difference in miles of trails in each district — 43 in TMD and 128 in RMD. Adding new trails to this area that currently has none would be a beneficial localized long-term moderate impact, for the impact would be readily apparent.

### *Northwest Planning Area*

A new hiker only trail would be constructed to provide access to Panther and Safford Peaks, resulting in a new recreational opportunity for hikers. Also, an ADA interpretive trail would be constructed to access the historic CCC camp. These actions would reduce the amount of social trailing to this area, and all social trails would be closed, which would restore a sense of natural conditions and improve safety. Golden Gate Road would be converted to a multiuse trail and is discussed in more detail in the “South Central Planning Area” section below. Overall, under alternative A, creating new trails to park attractions, as well as providing new ADA access, would be a readily apparent change to visitor use and experience, resulting in a beneficial localized long-term moderate impact.

### *South Central Planning Area*

As under the no action alternative, under alternative A, Golden Gate Road would be closed to motor vehicle access and converted to a multiuse trail, resulting in a beneficial impact on visitor use. A new trail would connect Picture Rocks Wash with Prophecy Wash, and the Bajada and Dobe Wash trails would also be connected. This connectivity would create two new loop opportunities; some visitors have suggested more loop trails to alleviate user group conflicts. During public scoping for the GMP, equestrians felt that the park is taking away their loop trail opportunities; they do not want out-and-back trails (NPS 2008b). Although the Bajada Wash Trail is closed to equestrians from the Valley View Overlook Trail to the Sus Picnic Area, they would be allowed on Prophecy and Picture Rocks Washes. Two new ADA trails would also be added in this area, providing more access for a variety of park visitors. One trail, Wild Dog Trail, would be removed and restored to natural conditions. Although this would be an adverse impact on visitor use, this trail would be somewhat redundant after connecting Bajada and Dobe Wash trails. Overall, these readily apparent impacts would be beneficial, localized, long-term, and moderate due to the addition of new trail connections and new ADA trails.

### *East Boundary Planning Area*

Several existing social trails would be formalized into new official trails in the East Boundary Planning Area, and new access points and trailheads would provide access to these trails. This new network of trails would include a loop and would be open to hikers and equestrians. Trails would go to some of the attractions visitors have said they wanted access to in this area (mines, crested saguaro, windmill). Impacts of new trail opportunities in an area that currently has few would be readily apparent, resulting in beneficial localized long-term moderate effects under alternative A.

### *Access Points and Trailheads*

Under alternative A, four designated access points and four new trailheads would be provided in areas that currently have none (the Northeast and Eastern planning areas) or few (the Northwest Planning Area). Some of these access points exist where new residential development abuts the park boundary, and

social trails have become a problem. By formalizing access points and trailheads, the number of social trails would decrease while improving safety and providing official access to the park. As mentioned under the “RMD” section, many people have requested additional access to the park. Impacts under alternative A would be readily apparent and would be beneficial, district-wide, long-term, and moderate.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to alternative A, with some differences in certain areas. In the Northeast Corner Planning Area, recent development, combined with new access into the park and new recreational opportunities (providing a new loop trail and two new access points) would increase visitor use in an area that currently has no trails. Similarly, providing a new trail to Panther and Safford Peaks in the Northwest Planning Area, as well as providing new trail opportunities in the South Central and Eastern Boundary planning areas, would combine with the effects of increased development to help distribute visitor use. Combining increased access and new trail opportunities with increasing development would be a beneficial regional long-term minor impact on visitor use and experience.

The minor trail reroutes the park would undertake under a categorical exclusion would be more effective when combined with alternative A’s specific plans for the redundant trails, washes, and social trails compared to the no action alternative. The result would be a minor beneficial effect, particularly on safety, as trails may be rerouted around heavily eroded areas.

Compared to the cumulative impacts expected under the no action alternative these differences would be so small in relation to the past, present, and future effects of encroaching development as to result in no measurable difference. Cumulative impacts would be adverse, regional, long-term, and moderate. Alternative A would provide a small incremental impact to overall cumulative impacts.

### *Conclusion*

A total of 15.4 new miles of trails would be added district-wide compared to 0.9 miles that would be removed, resulting in a gain of 14.5 miles over existing conditions. Under alternative A, adding new trails to the Northeast Corner Planning Area, which currently has none, would be a beneficial localized long-term moderate impact. Similarly, in the Northwest Planning Area, creating new trails to park attractions, as well as providing new ADA access, would be a beneficial localized long-term moderate impact. Impacts in the South Central Planning Area would be beneficial, localized, long-term, and moderate due to the addition of new trail connections and new ADA trails. Impacts of providing new trail opportunities in the East Boundary Planning Area, which currently has few, would result in beneficial localized long-term moderate effects. Formalizing and adding four access points and four trailheads would be beneficial, district-wide, long-term, and moderate. Cumulative impacts would be adverse, regional, long-term, and moderate.

## Alternative B Analysis

Alternative B would affect visitor use and experience in each of the planning areas as follows:

### *Northeast Corner Planning Area*

Under alternative B, changes would be similar to alternative A, but three loops (instead of one) and three access points would be created. Relocating the trail crossing for the Ringtail Trail would provide for safer crossing conditions from the Box Canyon parking lot across Picture Rocks Road. The result would be a gain over alternative A, but overall impact levels would remain the same because changes would be readily apparent, and many visitors would be affected, resulting in beneficial localized long-term moderate effects.

### *Northwest Planning Area*

In the Northwest Planning Area, changes under alternative B would also be similar to alternative A, but the ADA interpretive trail to the CCC camp would permit horses along the southern leg only. No horses would be allowed on the top part of the loop, which would access the new trailhead. However, an additional spur and access point to the west would provide horse parking and equestrian access to this area. Therefore, there would be minimal impacts on equestrians under alternative B compared to alternative A, and ADA visitors would have the opportunity to use a trail section without encountering horses, which would reduce potential for conflicts and would improve safety. Impact levels would remain readily apparent and therefore would be the same under alternative B as under alternative A: beneficial, localized, long-term, and moderate.

### *South Central Planning Area*

As in alternative A, under alternative B, connecting Picture Rocks Wash with Prophecy Wash would create a new loop opportunity. Wild Dog Trail would remain, and Bajada and Dobe Wash Trails would not be connected — same as the no action alternative. A new hiker and equestrian trail would be constructed from the Red Hills Visitor Center to the southwestern corner of the park, where the proposed Central Arizona Project Trail may terminate, providing new regional connectivity. The new loop trail and the new trail to the Central Arizona Project would result in readily apparent changes and would benefit park visitors. Impacts under alternative B would be beneficial, localized and regional, long-term, and moderate.

### *East Boundary Planning Area*

Changes under alternative B would be similar to alternative A, but additional trails and access points would be added. Bicycles would be allowed on the Belmont Trail. The result would be more and varied trail opportunities in this area. However, overall impacts would remain the same under alternative B as under alternative A because changes would be readily apparent, and many visitors would be affected, resulting in beneficial localized long-term moderate effects.

### *Access Points and Trailheads*

Under alternative B, nine new access points and three new trailheads would be provided in areas that currently have none (the Northeast and Eastern planning areas), or few (the Northwest Planning Area). As in alternative A, under alternative B, some of these access points exist where new residential development abuts the park boundary, and social trails have become a problem. By formalizing and adding access points and trailheads, the number of social trails would decrease while providing official access to the park. Impacts would be readily apparent and would be beneficial, district-wide, long-term, and moderate.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to alternative B, with some differences in certain areas. Most of the differences under alternative B compared to alternative A would be so slight as to result in no measurable change to cumulative impacts (e.g., providing three new trail loops in the Northeast Corner Planning Area instead of one). Combining increased access and new trail opportunities with increasing development would be a beneficial regional long-term minor impact on visitor use and experience.

The minor trail reroutes the park would undertake under a categorical exclusion would be more effective when combined with alternative B’s specific plans for the redundant trails, washes, and social trails compared to the no action alternative. The parkwide sign plan, when combined with the changes to trail routes under alternative B, would help educate visitors about the new changes and would aid with way finding and improve safety. The result of these actions would be a beneficial effect.

Compared to the cumulative impacts expected under the no action alternative, under alternative B, these differences would be so small in relation to the past, present, and future effects of encroaching development as to result in no measurable difference. Cumulative impacts would be adverse, regional,

long-term, and moderate. Alternative B would provide a small incremental impact to overall cumulative impacts.

### *Conclusion*

Under alternative B, a total of 18.7 new miles of trails would be added district-wide, and none would be removed. In the Northeast Corner Planning Area, changes would be similar to alternative A, but three loops (instead of one) and three access points would be created. The result would be a gain over alternative A, but overall impacts would remain the same: beneficial, localized, long-term, and moderate. In the Northwest Planning Area, changes under alternative B would also be similar to alternative A, but the ADA interpretive trail to the CCC camp would permit horses along the southern leg only. Impact levels would remain the same as alternative A: beneficial, localized, long-term, and moderate. In the South Central Planning Area, impacts from new trail opportunities would be beneficial, localized and regional, long-term, and moderate. Changes at the East Boundary Planning Area include additional trails and access points, and bicycles would be allowed on the Belmont Trail. The result would be more and varied trail opportunities in this area. However, overall impacts under alternative B would remain the same as alternative A: beneficial, localized, long-term, and moderate. Formalizing and adding nine access points and three trailheads would be beneficial, district-wide, long-term, and moderate. Cumulative impacts would be adverse, regional, long-term, and moderate.

## Preferred Alternative Analysis

The preferred alternative would affect visitor use and experience in each of the planning areas as follows:

### *Northeast Corner Planning Area*

Under the preferred alternative, changes would be similar to alternative B, but two loops would be retained instead of three. The trail proposed under alternative B that parallels the park boundary would not be included. However, changes would be readily apparent, and many visitors would be affected, so impact levels would remain the same: beneficial, localized, long-term, and moderate.

### *Northwest Planning Area*

Changes would be the same under the preferred alternative as under alternative B, with the addition of converting the Cactus Wren and Manville trails to hiker and equestrian. These trails receive very low intensity of use. Equestrians would interpret this as beneficial from the resulting gain of recreational opportunities within the park. Hikers, particularly those who have expressed a dislike for horses, would interpret this as an adverse impact. The overall effect may result in increased conflicts on these trails; however, these trails receive little use. Impacts would be detectable, ranging from slight to readily apparent, depending on the visitor and his or her interpretation of the change, resulting in adverse and beneficial localized long-term minor to moderate effects.

### *South Central Planning Area*

As in alternative A, under the preferred alternative, Picture Rocks Wash would connect with Prophecy Wash, and Bajada Wash would connect with Dobe Wash, resulting in a beneficial impact from creating a loop opportunity. In addition, King Canyon Wash would be designated as a trail. As in alternative B, a new trail would be constructed from the visitor center to the southwestern park boundary to connect with the proposed Central Arizona Project Trail; a new ADA compliant trail would loop off of this trail. Both would result in beneficial impacts by providing new experiences for a variety of visitors. Also as in alternative B, Wild Dog Trail would remain. However, under the preferred alternative, it would be converted to hiker only. At Signal Hill, horses would be rerouted around the northern portion of the hill and a hitching post would be installed close to the picnic area. The picnic area and trail from the picnic area to Signal Hill would be hiker only. Horses are not currently allowed in this area; equestrians would

generally interpret this as a beneficial impact, and hikers would interpret this as both beneficial and adverse for those who have expressed a dislike for horses. Impacts would be detectable, ranging from slight to readily apparent, depending on the visitor and his or her interpretation of the change, resulting in adverse and beneficial localized long-term minor to moderate effects.

### *East Boundary Planning Area*

Changes to the East Boundary Planning Area under the preferred alternative would be similar to alternative B. Slight differences between these alternatives would not result in a measurable difference to visitor use and experience. There would be more and varied trail opportunities in this area, such as bicycle use on the Belmont Trail, compared to current conditions. Impacts would be beneficial, localized, long-term, and moderate.

### *Access Points and Trailheads*

The same number of access points and trailheads proposed under alternative B would also be provided under the preferred alternative although they would be distributed slightly differently. There would be one less access point in the Eastern Boundary Planning Area and one more in the Northwest Planning Area, which would provide more direct access to the new trails to Panther and Safford Peaks. As in alternative A, under the preferred alternative, some of these access points exist where new residential development abuts the park boundary, and social trails have become a problem. Formalizing and adding access points and trailheads would decrease the number of social trails while providing official access to the park. Impacts would be readily apparent and would be beneficial, district-wide, long-term, and moderate.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to the preferred alternative, with some differences in certain areas. Most of the differences under the preferred alternative compared to alternative A would be so slight as to result in no measurable change to cumulative impacts (e.g., providing two new trail loops in the Northeast Corner Planning Area instead of one). Combining increased access and new trail opportunities with increasing development would be a beneficial regional long-term minor impact on visitor use and experience.

The minor trail reroutes the park would undertake under a categorical exclusion would be more effective when combined with the preferred alternative’s specific plans for the redundant trails, washes, and social trails compared to the no action alternative. The parkwide sign plan, when combined with the changes to trail routes under the preferred alternative, would help educate visitors about the new changes and would aid with way finding and improve safety. The result of these actions would be a beneficial effect.

Compared to the cumulative impacts expected under the no action alternative, under the preferred alternative, these differences would be so small in relation to the past, present, and future effects of encroaching development as to result in no measurable difference. Cumulative impacts would be adverse, regional, long-term, and moderate. The preferred alternative would provide a small incremental impact to overall cumulative impacts.

### *Conclusion*

Nearly 15.1 miles of new trails would be added district-wide under the preferred alternative (no official trails would be removed). In the Northeast Corner Planning Area, changes would be similar to alternative B, but two loops would be retained instead of three. Impacts would be beneficial, localized, long-term, and moderate. Impacts in the Northwest Planning Area, resulting from the conversion of two trails to hiker and equestrian, would be adverse and beneficial, localized, long-term, and minor to moderate, depending on the visitor. In the South Central Planning Area, impacts would also be adverse and beneficial, localized, long-term, and minor to moderate for similar reasons. The same number of access points and trailheads proposed under alternative B would also be provided under the preferred alternative

although they would be distributed slightly differently. Impacts would be beneficial, district-wide, long-term, and moderate. Cumulative impacts would be adverse, regional, long-term, and moderate.

## *Park Management and Operations*

### Methodology

Park management and operations refers to the current staff available to adequately protect and preserve vital park resources and provide for an effective visitor experience. This topic also includes the operating budget necessary to conduct park operations.

### Intensity Thresholds

The discussion of impacts on park operations focuses on (1) number of staff available to ensure visitor and resident safety, and (2) the ability of park staff to protect and preserve resources given current funding and staffing levels. It was assumed that under all alternatives, the park would apply for and receive funding to implement the alternative. However, this funding is not guaranteed; each alternative discusses the impacts of receiving or not receiving additional funding. Park staff knowledge was used to evaluate the impacts of each alternative, and the evaluation is based on the current description of park operations presented above. The intensity thresholds of an impact for Park Management and Operations are defined as follows:

> *Negligible*: Park operations would not be affected, or effects would not be measurable or would be outside of normal variability. There would not be a noticeable effect on park operations.
>
> *Minor*: Effects 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*: Effects on park operations and facilities would be clearly detectable and could have a noticeable effect on the park's ability to provide adequate services and facilities to visitors and staff. Measures such as increased staffing and funding might be necessary to provide services and facilities to the visiting public.
>
> *Major*: Effects would have a substantial influence on park operations and facilities and would include impacts that would change the park's ability to provide adequate services and facilities to visitors and staff. Increased staff and funding would be needed, or other park programs would have to be eliminated.

### No Action Alternative

#### Rincon Mountain District

The RMD contains four distinct planning areas; Manning Camp, Southern Boundary, Cactus Forest, and Foothills and Mountains.

*Manning Camp Planning Area*

The current condition of trails in the Manning Camp Planning Area would remain the same under the no action alternative, and there would be no change in park operations. Social trails would continue to develop adjacent to wash banks. Trail widening and erosion would continue to require ongoing maintenance. Comprehensive guidance for trail design, mitigation, signs, and standards would not be undertaken. Park staff would have insufficient funding to address all trail maintenance and repair issues. As a result, park staff would continue to do the minimum amount of work necessary to keep open trails that are noticeably well beyond maintenance yet would still try to maintain redundant and poorly

designed trails. Park staff would continually approach problems with short-term, partial remedies to ongoing trail problems not covered by existing plans. Inadequate trail maintenance would continue, creating further problems for park operations in the long term. Effects on park operations and facilities would be clearly detectable and could have a noticeable effect on the park's ability to provide adequate services and facilities to visitors and staff. Increased staff and funding would be required to provide adequate services and facilities to the visiting public. The overall poor condition of the trails would require a level of staff time and effort not budgeted for under this alternative in order to make repairs and manage multiple uses. For this reason, impacts on park management and operations would be adverse, localized, short- and long-term, and moderate.

### *Southern Boundary Planning Area*

Impacts on park management and operations in the Southern Boundary Planning Area would be the same as those described for the Manning Camp Planning Area. The current configuration of trails in the Southern Boundary Planning Area would remain the same under the no action alternative, and there would be no change in park operations. Impacts on park management and operations would be adverse, localized, short- and long-term, and moderate.

### *Cactus Forest Planning Area*

Impacts on park management and operations in the Cactus Forest Planning Area would be similar to those described for the Manning Camp Planning Area except that the impacts would be increased due to a higher level of visitor use. The current configuration of trails in the Cactus Forest Planning Area would remain the same under the no action alternative, and there would be no change in park operations. In addition, the district's most intensely used trails are located in the Cactus Forest Planning Area, particularly the Douglas Spring, Shantz, and Pink Hill trails. Due to a lack of adequate signs and redundancy of trails, visitors would continue to have difficulty in way finding, and user group conflicts on trails and at trailheads would continue, requiring the park to pull staff from other projects and duties to manage traffic, enforce appropriate visitor use, and repair damaged resources. Impacts on park management and operations would be adverse, localized, short- and long-term, and moderate.

### *Foothills and Mountains Planning Area*

Impacts on park management and operations in the Foothills and Mountains Planning Area would be the same as those described for the Manning Camp Planning Area. The current configuration of trails in the Foothills and Mountains Planning Area would remain the same under the no action alternative, and there would be no change in park operations. Impacts on park management and operations would be adverse, localized, short- and long-term, and moderate.

### *Parking Areas*

Under the no action alternative, 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. The park would continue to pull staff from other projects and duties in order to manage traffic, enforce appropriate visitor use, and repair damaged resources. There would be a noticeable effect on the park's ability to provide adequate services and facilities. Impacts on park management and operations would be adverse, localized, short- and long-term, and moderate.

### *Cumulative Impacts*

Implementation of the park's GMP has established the park's management direction for the next 15 to 20 years. The past, present, and reasonably foreseeable future actions with potential to affect park management and operations are related primarily to encroaching development around the park. As the population of Tucson continues to grow, and open spaces continue to diminish, the park area would likely experience more increased traffic, visitation, and associated trail degradation and impacts on resources. Past grazing activities, combined with intermittent droughts, have caused accelerated sheet erosion and

formation of gullies in some areas due to channelizing of water flow. Trail conditions are still adversely and noticeably influenced by these past activities, requiring continual maintenance. The boundary fence has been beneficial in helping park operations by providing a physical barrier defining the park boundary and reducing illegal off-road vehicle use. Park staff would continue to perform minor trail re-routes in both districts on an as-needed basis. The parkwide sign plan would provide visitors with information in the park's frontcountry and backcountry; this would alleviate the burden on park staff who might otherwise be pulled from other tasks to manage visitor conflicts and help those in need of way finding. However, these actions would make a small overall contribution to cumulative impacts compared to the effects of increased development. Impacts of the actions described above, particularly development, would have an overall adverse local short- and/or long-term moderate impact on park management and operations, as these impacts have been, and would continue to be, readily apparent. When combined with the no action alternative's primarily adverse impacts due to lack of proper trails planning and design, cumulative impacts would be adverse, local, long-term, and moderate. The no action alternative would provide a small incremental contribution to overall cumulative impacts.

#### *Conclusion*

Impacts associated with the overall poor condition of the trails and the level of effort to maintain these trails not budgeted for under this alternative would be adverse, localized, short- and long-term, and moderate. Under the no action alternative, staff would continue to be pulled from other projects and duties to manage visitor conflicts, manage visitor safety and way finding issues, and repair damaged resources, resulting in adverse localized short- and/or long-term moderate impacts on park management and operations. Cumulative impacts would be adverse, local, long-term, and moderate.

### Tucson Mountain District

The TMD contains four distinct planning areas; Northeast Corner, Northwest, South Central, and East Boundary.

#### *Northeast Corner Planning Area*

Impacts on park management and operations in the Northeast Corner Planning Area would be similar to those described for the Manning Camp Planning Area except the impacts would be increased due to a higher level of visitor use. The current configuration of trails in the Northeast Corner Planning Area would remain the same under the no action alternative, and there would be no change in park operations. Impacts on park management and operations would be adverse, localized, short- and long-term, and moderate.

#### *Northwest Planning Area*

Impacts on park management and operations in the Northwest Planning Area would be the same as those described for the Manning Camp Planning Area. The current configuration of trails in the Northwest Planning Area would remain the same under the no action alternative, and there would be no change in park operations. Impacts on park management and operations would be adverse, localized, short- and long-term, and moderate.

#### *South Central Planning Area*

Impacts on park management and operations in the South Central Planning Area would be the same as those described for the Manning Camp Planning Area. The current configuration of trails in the South Central Planning Area would remain the same under the no action alternative, and there would be no change in park operations. Impacts on park management and operations would be adverse, localized, short- and long-term, and moderate.

#### *East Boundary Planning Area*

Impacts on park management and operations in the South Central Planning Area would be similar to those described in the Manning Camp Planning Area except impacts would be increased due to a higher level of visitor use. The current configuration of trails in the South Central Planning Area would remain the same under the no action alternative, and there would be no change in park operations. Impacts on park management and operations would be adverse, localized, short- and long-term, and moderate.

*Parking Areas*

Under the no action alternative, impacts on parking areas in the TMD would be the same as those in the RMD. There would be a noticeable effect on the park's ability to provide adequate services and facilities. Impacts on park management and operations would be adverse, localized, short- and long-term, and moderate.

*Cumulative Impacts*

Cumulative impacts on park management and operations would be the same as those in the RMD. When combined with the no action alternative's primarily adverse impacts due to lack of proper trails planning and design, cumulative impacts would be adverse, local, long-term, and moderate. The no action alternative would provide a small incremental contribution to overall cumulative impacts.

*Conclusion*

Impacts associated with the no action alternative in the TMD would be the same as those in the RMD. Resulting impacts would be adverse, localized, short- and long-term, and moderate. Cumulative impacts would be adverse, local, long-term, and moderate.

## Rincon Mountain District

### Alternative A Analysis

*Manning Camp Planning Area*

Under alternative A, impacts associated with the Manning Camp Planning Area would be similar to those described under the no action alternative with the exception of the removal of Bonita Trail, which would be restored to natural conditions. Closing Bonita Trail would benefit park operations because they would no longer spend time and money to maintain a redundant trail. Effects on park operations compared to the no action alternative would be slightly detectable, and impacts from removing this trail would be beneficial, site-specific, short- and long-term and minor.

*Southern Boundary Planning Area*

The Hope Camp Trail would be converted to a multiuse trail to allow bicycle, horse, and hiker use, and the eastern portion of the trail would be extended to the southern boundary of the park and include a new access point at the boundary. The North Hope Trail would be removed and restored to natural conditions. The new access point at the southern boundary would likely increase human traffic due to accessibility. The conversion to a multiuse trail and the increased traffic would require increased ranger presence and enforcement. Modifications to Hope Camp Trail to accommodate bikes (i.e., removing culverts and modifying stream crossings) would also incur additional expense.

The Arizona Trail would connect to the Hope Camp Trail and continue approximately 4.2 miles northeast to a connection with the Manning Camp Trail. Additional costs for maintenance of new trails would be incurred, and without additional staff, park operations would not be able to provide adequate services for the visitors. Park staff would be required to supervise Arizona Trail volunteers who would help build the trail; park crews would likely perform much of the more strenuous work. The new trail would be an arduous hike, and emergency response times would increase along the new trail to the mountain. There may also be impacts from illegal camping which would require increased enforcement and restoration after illegal use. The addition of new access points and the connection to the Arizona Trail would

adversely impact park management and operations by requiring staff enforcement and off-trail rehabilitation. Since the park intends to rely on the Arizona Trail Association for construction funding and ongoing maintenance support, there would be no impact on park operations for construction and maintenance of the Arizona Trail. Measures such as increased staffing and funding might be necessary to provide services and facilities to the visiting public. Impacts under alternative A would be adverse, short- and long-term, local, and moderate.

### *Cactus Forest Planning Area*

In the Cactus Forest Loop area, the Lime Falls Trail that spurs off of the Cactus Forest Trail would be extended east to connect to the eastern portion of Cactus Forest Loop Dr. A hiker only trail would be added around Javelina Rocks. In the Cactus Forest trail system that is accessed by Speedway and Broadway boulevards, 10 trails would be removed and restored to natural conditions. The Ernie's Falls Trail would be constructed to connect the Douglas Spring Trail to the existing trail on USFS land. A trail would also be constructed from the Shantz Trail to the Mica View Picnic Area. The Loma Verde, Monument, and Deer Valley washes would be designated as trails. The addition of new trails would incur additional time and cost for construction and maintenance. However, closing 10 trails which are redundant and in poor condition would benefit park operations because time and money would no longer be spent to maintain and repair the trails. Visitors would no longer have as much difficulty with way finding and would require less assistance from park staff. Effects on park operations would be clearly detectable, and impacts from removing these trails would be beneficial, site-specific, short- and long-term, and moderate.

### *Foothills and Mountains Planning Area*

Alternative A actions would be the same as the no action alternative; impacts on park management and operations would be adverse, localized, short- and long-term, and moderate.

### *Parking Areas*

Under alternative A, parking in the RMD would consist of paved parking for cars, gravel for horse trailers, a vault toilet, a shade ramada, concrete curbing and sidewalks, and other amenities, such as signs and trash receptacles, at the following locations:

- Speedway at the Douglas Springs/Wildhorse trailhead (Vehicle/Horse)
- Two parking areas at Broadway (Vehicle and Horse) at the Cactus Forest trailhead and the end of the road
- Camino Loma Alta at the Loma Alta trailhead

Redesigned and improved parking would help improve visitor safety. Horse trailer parking and car parking would be designed to reduce conflicts and would provide beneficial impacts by slightly reducing enforcement needs in parking areas. However, the parking lot amenities, such as trash receptacles and vault toilets, would require long-term operational maintenance. Overall, under alternative A, impacts on park management and operations would be beneficial and adverse, site-specific, short- and long-term and negligible.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to alternative A, with some differences in certain areas. In the Southern Boundary Planning Area, the connection to the Arizona Trail and the conversion of Hope Camp Trail would likely result in increased staffing and funding needs in order to provide services and facilities to the visiting public. In the Cactus Forest Planning Area, 2 new trails would be constructed, but 10 trails would be removed and restored. Removing trails that are redundant and in poor condition would benefit park operations by eliminating ongoing maintenance and repair on these trails. The new parking areas

would require long-term operational maintenance but would also reduce visitor safety issues and parking lot enforcement needs.

Compared to the cumulative impacts expected under the no action alternative, under alternative A, these differences in relation to the past, present, and future effects of encroaching development would result in a measurable difference. Cumulative impacts would be adverse and beneficial, site-specific and local, short- and long-term, and minor to moderate. Alternative A would provide a small incremental contribution to overall cumulative impacts.

#### *Conclusion*

Under alternative A, removing and restoring the Bonita Trail in the Manning Camp Planning Area would result in primarily beneficial site-specific short- and/or long-term minor impacts on park management and operations. In the Southern Boundary Planning Area, the addition of bicycle use and a new connection to the Arizona Trail would result in adverse localized long-term moderate impacts. Within the Cactus Forest Planning Area, some new trails and designated washes would be added, and 10 trails would be removed and restored to natural conditions. Impacts would be beneficial, site-specific, short- and long-term, and moderate. In the Foothills and Mountains Planning Area, no change would occur under alternative A compared to the no action alternative. Impacts would be adverse, localized, short- and long-term, and moderate. Improved access and parking would be beneficial and adverse, site-specific, short- and long-term, and negligible. Cumulative impacts would be primarily beneficial, site-specific and local, short- and long-term, and negligible.

### Alternative B Analysis

#### *Manning Camp Planning Area*

Under alternative B, there would be no change compared to the no action alternative. Impacts would be adverse, localized, short- and long-term, and moderate.

#### *Southern Boundary Planning Area*

Unlike alternative A, under alternative B, bicycles would not be allowed on the Hope Camp Trail, and the North Hope Camp Trail would not be removed and restored to natural conditions. Therefore, there would be no change compared to baseline conditions (no action alternative) with the exception of two new trails and associated access points proposed for the Southern Boundary Planning Area, which would require maintenance. Impacts associated with the new trails would be adverse, long-term, site-specific, and negligible.

#### *Cactus Forest Planning Area*

Under alternative B, a hiker only trail would loop around Javalina Rocks and Javelina Wash, and two of its tributaries would be designated as official trails. Use of big washes by horses is preferable; after floods, park staff would need to do maintenance to clear debris.

Fewer trails (6) would be removed and restored to natural conditions under alternative B compared to alternative A. Beneficial impacts of doing so would be similar to alternative A but to a lesser extent because fewer trails would be restored. The Ernie’s Falls Trail and access would be developed as under alternative A. The Carillo and Garwood trails would be converted to hiker only trails. Under alternative B, impacts on park management and operations would be beneficial, site-specific, short- and long-term, and moderate.

#### *Foothills and Mountains Planning Area*

There would be no change under alternative B compared to the no action alternative with the exception that the Arizona Trail would enter the park in this area. Under alternative B, Arizona Trail users would connect with the existing Tanque Verde Ridge Trail on the park’s western boundary. A new trail would

not be created to provide access into the park, as would be the case under alternative A. Use of the Tanque Verde Ridge Trail would increase although conflicts are not likely because this trail would remain hiker only. The change would be detectable but slight. As under alternative A, under alternative B, through-hikers would have to travel far into the park before encountering a legal campsite; therefore, illegal camping could occur along the Tanque Verde Ridge Trail, which would require NPS staff enforcement and restoration at times. Overall, under alternative B, impacts would be adverse, localized, short- and long-term, and negligible.

### *Parking Areas*

Impacts associated with parking under alternative B would be as described under alternative A: beneficial and adverse, site-specific, short- and long-term, and negligible.

### *Cumulative*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to alternative B with similar differences as described under alternative A. In the Southern Boundary Planning Area, new development proposed under the *Rincon/Southeast Subregional Plan* would combine with new access points in this area. The multiuse trail and Arizona Trail connection described for alternative A would not occur under alternative B, but new access points would likely increase visitor use in this area. Cumulative impacts related to conflicts and safety would require additional enforcement which would be an adverse and slightly detectable impact on park operations. Providing increased access and new trails to an increasing local population would strain park staff operations and be an adverse local long-term minor impact on park management and operations.

Within the Cactus Forest Planning Area, new trails, the new access point to USFS lands to the north, and minor trail reroutes would combine with other actions in the area. The reduction of redundant trails and the parkwide sign plan, when combined with the changes to trail routes under alternative B, would reduce the effort required for maintaining trails in poor condition, would aid with way finding, and would improve safety. The result of these actions would be a beneficial effect.

Compared to the cumulative impacts expected under the no action alternative, under alternative B, these differences in relation to the past, present, and future effects of encroaching development would result in a measurable difference. Cumulative impacts would be adverse, site-specific and local, short- and long-term, and minor to moderate. This alternative would provide a small incremental contribution to overall cumulative impacts.

### *Conclusion*

In the Manning Camp Planning Area, there would be no change under alternative B compared to the no action alternative. Impacts would be adverse, localized, short- and long-term, and moderate. Impacts in the Southern Boundary Planning Area would be adverse, long-term, site-specific, and negligible. In the Cactus Forest Planning Area, some new trails would be added, and fewer trails would be removed under alternative B than under alternative A. Two existing trails would be converted to hiker only; impacts would be beneficial, site-specific, short- and long-term, and moderate. At the Foothills and Mountains Planning Area, impacts would be adverse, localized, short- and long-term, and negligible for reasons described under alternative A with mostly adverse impacts related to the use of the Tanque Verde Ridge Trail to connect to the Arizona Trail. Overall impacts associated with parking lots would be beneficial and adverse, site-specific, short- and long-term and negligible. Cumulative impacts would be adverse, site-specific and local, short- and long-term, and minor to moderate.

## Alternative C Analysis

### *Manning Camp Planning Area*

Under alternative C, there would be no change compared to alternative A. Impacts would be beneficial, site-specific, short- and long-term, and minor.

### *Southern Boundary Planning Area*

The trail configuration for alternative C would be the same as the trail configuration in alternative B. Impacts would be adverse, long-term, site-specific, and negligible. Unlike alternative B, under alternative C, bicycles would be allowed on Hope Camp Trail and the North Hope Camp Trail would be removed and restored. The Arizona Trail alignment under alternative C would be the same as described for alternative A. Impacts associated with the alignment of the Arizona Trail would be adverse, short- and long-term, local, and moderate.

Overall, the long-term impacts on park management and operations in the Southern Boundary Planning Area would be adverse due to the addition of bicycle use and a new connection to the Arizona Trail, both of which would require additional staff and funding for park management and operations. Impacts on park management and operations would be readily apparent, resulting in adverse short- and/or long-term local moderate impacts.

### *Cactus Forest Planning Area*

Under alternative C, a new multiuse trail would be constructed from Old Spanish Trail near Escalante Road and would connect to the Cactus Forest Trail. This new trail would provide a connection to a multiuse trail and more trail use opportunities in the park. As in alternative B, under alternative C, a hiker only trail would be constructed around Javelina Rocks and would be accessed by Cactus Forest Loop Drive. In addition, a new trail originating at the proposed Freeman Road access would connect with the Shantz Trail. Similar to alternative B, Javelina Wash and its two tributaries south of the Cactus Forest Loop Drive would be designated as official trails. In addition, Loma Verde Wash, Monument Wash, Deer Valley Wash, and Bajada Wash would also be designated as official trails. Nine existing trails would be removed and restored under alternative C. Impacts from removing redundant trails in the Cactus Forest Planning Area would be similar to alternative A. As under alternative A, under alternative C, reducing the number of redundant trails would improve way finding and safety.

Overall, effects on park operations under alternative C would be clearly detectable, and impacts would be primarily beneficial, site-specific, short- and long-term, and moderate.

### *Foothills and Mountains Planning Area*

Under alternative C, there would be no change compared to the no action alternative. Impacts would be adverse, localized, short- and long-term, and moderate.

### *Parking Areas*

Impacts associated with parking under alternative C would be the same as described under alternative A: beneficial and adverse, site-specific, short- and long-term, and negligible.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to alternative C, with similar differences as described under alternative A. In the Southern Boundary Planning Area, new development proposed under the *Rincon/Southeast Subregional Plan* would combine with new access points in this area. The multiuse trail and Arizona Trail described for alternative A would occur under alternative C. Six new access points would likely increase visitor use in this area. Increased access and new trails provided for an increasing local population would increase demand on park management and operations and be an adverse local short- and/or long-term moderate impact.

Similar impacts at the Cactus Forest Planning Area would apply as a result of new trails, the new access point to USFS lands to the north, and the minor trail reroutes that would combine with other actions in the area. The parkwide sign plan, when combined with the changes to trail routes under alternative C, would help educate visitors about the new changes and would aid with way finding and improve safety. The

reduction of redundant trails would reduce maintenance needs, and the overall effects would be beneficial.

As in alternative A, under alternative C, these differences would be so small in relation to the past, present, and future effects of encroaching development as to result in no measurable difference from current conditions. Cumulative impacts would be beneficial and adverse, site-specific and local, short- and long-term, and moderate. This alternative would provide a small incremental contribution to overall cumulative impacts.

### *Conclusion*

In the Manning Camp Planning Area, there would be no change under alternative C compared to the no action alternative. Impacts would be beneficial, site-specific, short- and long-term, and minor. Impacts in the Southern Boundary Planning Area would be adverse, short- and long-term, local, and moderate due to a new trail connecting to the Arizona Trail. In the Cactus Forest Planning Area, some new trails would be added (including 1 multiuse and 1 hiker only trail) and 9 trails would be removed compared to 10 for alternative A. Impacts would be beneficial, site-specific, short- and long-term, and moderate. At the Foothills and Mountains Planning Area, impacts would be adverse, localized, short- and long-term, and moderate for reasons described under the no action alternative. Cumulative impacts would be beneficial and adverse, local, short- and long-term, and moderate.

## Preferred Alternative Analysis

### *Manning Camp Planning Area*

There would be no change under the preferred alternative compared to the no action alternative. Impacts on park management and operations would be adverse, localized, short- and long-term, and moderate.

### *Southern Boundary Planning Area*

Under the preferred alternative, impacts would be the same as alternative C: adverse, short- and long-term, local, and moderate.

### *Cactus Forest Planning Area*

Similar to alternative B, under the preferred alternative, fewer trails (7) would be removed and restored to natural conditions compared to alternative A. Also as under alternative B, two existing trails would be converted to hiker only. Impacts of these actions would be similar to alternative B: beneficial, site-specific, short- and long-term, and moderate.

Additional maintenance related to converting washes to designated trails would be similar to alternatives B and C. Converting washes to designated trails and adding a new wash would result in additional maintenance demands for park operations.

Overall, impacts under the preferred alternative would be similar to alternative B for the reasons stated under that analysis. Impacts of the preferred alternative would be beneficial, site-specific, short- and long-term, and moderate.

### *Foothills and Mountains Planning Area*

Same as the no action alternative. Impacts on park management and operations under the preferred alternative would be adverse, localized, short- and long-term, and moderate.

### *Parking Areas*

Impacts associated with parking under the preferred alternative would be the same as described under alternative A: beneficial and adverse, site-specific, short- and long-term, and negligible.

*Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to the preferred alternative, with similar differences as described under alternative A.

As in alternative A, under the preferred alternative, these differences would be so small in relation to the past, present, and future effects of encroaching development as to result in no measurable difference from current conditions. Cumulative impacts would be adverse, site-specific and local, short- and long-term, and minor to moderate. The preferred alternative would provide a small incremental contribution to overall cumulative impacts.

*Conclusion*

In the Manning Camp and the Foothills and Mountains planning areas, impacts under the preferred alternative would be the same as the no action alternative: adverse, localized, short- and long-term, and moderate. Impacts in the Southern Boundary Planning Area would be the same as alternative C: adverse, short- and long-term, local, and moderate. Overall, impacts in the Cactus Forest Planning Area would be beneficial, site-specific, short- and long-term, and moderate.

Impacts on parking areas would be beneficial and adverse, site-specific, short- and long-term, and negligible. Cumulative impacts would be adverse, site-specific and local, short- and long-term, and minor to moderate.

## Tucson Mountain District

### Alternative A Analysis

*Northeast Corner Planning Area*

Relocating the trail crossing for the Ringtail Trail would provide for safer crossing conditions from the Box Canyon parking lot across Picture Rocks Road. An interior loop trail would be added in this area with a new trailhead to the north and access point to the east. This new trail and access would replace existing social trails and provide access to the state land that lies within the park in this area. Social trails would be closed. NPS staff would not allow off-trail travel, which could result in enforcement issues with people visiting the park and additional staff needs for the enforcement. The new trails would incur additional costs for maintenance. The short-term impacts associated with new trails and closing social trails would be adverse, local, and moderate. However, after initial construction is complete for the new trails, minimal maintenance would be required. Once the visiting public becomes accustomed to the closure of social trails, enforcement needs would decline to a point where impacts on operations would not be measurable. Overall, in the long term, impacts would be adverse, local, and negligible.

*Northwest Planning Area*

A new hiker only trail would be constructed to provide access to Panther and Safford Peaks, resulting in a new recreational opportunity for hikers. Also, an ADA interpretive trail would be constructed to access the historic CCC camp. Park staff would provide educational opportunities for the new ADA trail. As described in the Northeast Corner Planning Area, all social trails would be closed. Portions of Golden Gate Road would be converted to a multiuse trail and is discussed in more detail in the “South Central Planning Area” section below. Overall, creating new trails to park attractions as well as providing new ADA access and closing social trails would require additional staff and funding for construction, maintenance, education, and enforcement. Impacts under alternative A would be adverse, local, short- and long-term and moderate.

*South Central Planning Area*

Under alternative A, Golden Gate Road would be closed to motor vehicle access and converted to a multiuse trail. A new trail would connect Picture Rocks Wash with Prophecy Wash, and the Bajada and Dobe Wash trails would also be connected. This connectivity would create two new loop opportunities. Two new ADA trails would also be added in this area, providing more access for a variety of park visitors. Social trails would be closed. One trail would be removed and restored to natural conditions. Park management and operations would benefit from no longer maintaining Golden Gate Road as a vehicular roadway; however, the multiuse trail would require maintenance. The loop opportunities may alleviate user group conflicts which may then alleviate NPS enforcement needs. The new trails would require maintenance; while the removal of Wild Dog Trail would reduce maintenance needs. Overall, impacts would be beneficial, local, long-term and negligible.

### *East Boundary Planning Area*

Several existing social trails would be formalized into new official trails in this area, and new access points and trailheads would provide access to these trails. This new network of trails would include a loop and would be open to hikers and equestrians. There are currently few trails in this area; the new trails would result in greater maintenance and enforcement needs in the East Boundary Planning Area. Impacts on park management and operations would be adverse, local, long-term, and moderate.

### *Parking*

Parking in the TMD would consist of the following:

- north end of Golden Gate Trail at Picture Rocks Road
- south end of Golden Gate Trail at the Sendero-Esperanza trailhead (Expand Existing Parking)

Both Golden Gate parking lots would consist of paved parking for cars, gravel for horse trailers, a vault toilet, a shade ramada, concrete curbing and sidewalks, and other amenities, such as signs and trash receptacles.

- CCC Camp trailhead on Rudasill Road, which would be paved for cars (no horse trailer parking) with concrete curbing and sidewalks; no toilet, no ramada, and no signs would be provided.
- Belmont, at the north end of the Pipeline Trail, which would be paved when the road is paved and would provide parking for cars; two horse trailer lots would also be provided. No toilet, ramada, or signs would be provided.

Impacts on park management and operations related to parking in the TMD would be the same as those described in the RMD. Overall, impacts on park operations under alternative A would be beneficial and adverse, site-specific, short- and long-term, and negligible.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to alternative A, with some differences in certain areas. In the Northeast Corner Planning Area, recent development in this area, combined with new access into the park and new recreational opportunities (providing a new loop trail and two new access points), would increase NPS staff and funding needs for maintenance and operations. Similarly, providing a new trail to Panther and Safford Peaks in the Northwest Planning Area, new trail opportunities in the South Central and Eastern Boundary planning areas, and additional parking areas would combine to result in an increase in NPS staff and funding needs for maintenance and operations. Combining increased access and new trails with increasing development would be an adverse local long-term moderate impact on park management and operations.

Compared to the cumulative impacts expected under the no action alternative, these differences in relation to the past, present, and future effects of encroaching development would result in a slight measurable difference. This alternative would provide a small incremental contribution to overall cumulative impacts.

### *Conclusion*

Under alternative A, adding new trails to the Northeast Corner Planning Area, which currently has no designated trails but many social trails, would result in adverse long-term local negligible impacts. Similarly, in the Northwest Planning Area, creating new trails to park attractions, as well as providing new ADA access, would result in adverse local short- and long-term moderate impacts. Impacts in the South Central Planning Area would be beneficial, local, long-term, and negligible due to the removal of one trail and the conversion of Golden Gate Road to a multiuse trail. Impacts of providing new trail opportunities in the East Boundary Planning Area, which currently has few designated trails, would result in adverse, local, long-term, and moderate effects. New parking areas in the TMD would result in beneficial and/or adverse site-specific short- and/or long-term negligible impacts. Cumulative impacts would be adverse, local, long-term, and moderate.

## Alternative B Analysis

### *Northeast Corner Planning Area*

Under alternative B, changes would be similar to alternative A, but three loops (instead of one) and three access points would be created. Relocating the trail crossing for the Ringtail Trail would provide for safer crossing conditions from the Box Canyon parking lot across Picture Rocks Road. The result would be similar to alternative A. The short-term impacts associated with new trails and the closing of social trails under alternative B would be adverse, local, and moderate. Overall, in the long-term, impacts would be adverse, local, and negligible.

### *Northwest Planning Area*

In the Northwest Planning Area, changes under alternative B would be similar to alternative A, but the ADA interpretive trail to the CCC camp would permit horses along the southern leg only. No horses would be allowed on the top part of the loop, which would access the new trailhead. However, an additional spur and access point to the west would provide horse parking and equestrian access to this area. ADA visitors would have the opportunity to use a trail section without encountering horses, which would reduce potential for conflicts and would improve safety. Impacts under alternative B would be readily apparent and would be the same as alternative A: adverse, local, short- and long-term, and moderate.

### *South Central Planning Area*

As in alternative A, under alternative B, connecting Picture Rocks Wash with Prophecy Wash would create a new loop opportunity. As in the no action alternative, Wild Dog Trail would remain and Bajada and Dobe Wash trails would not be connected. A new hiker and equestrian trail would be constructed from the Red Hills Visitor Center to the southwestern corner of the park. Impacts associated with maintaining new trails, in addition to continuing to maintain Wild Dog Trail, would be slightly noticeable and would be adverse, local, long-term, and negligible.

### *East Boundary Planning Area*

Under alternative B, changes would be similar to alternative A, but additional trails and access points would be added. Bicycles would be allowed on the Belmont Trail. The result would be more required trail maintenance and enforcement. However, overall impacts would remain the same as alternative A because changes would be readily apparent. Impacts on park management and operations under alternative B would be adverse, local, long-term and moderate.

### *Parking*

Impacts associated with parking under alternative B would be the same as described under alternative A: beneficial and adverse, site-specific, short- and long-term, and negligible.

### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to alternative B, with some differences in certain areas. Most of the differences compared to alternative A would be so slight as to result in no measurable change to cumulative impacts (e.g., providing three new trail loops in the Northeast Corner Planning Area instead of one). Combining increased access and new trails with increasing development would be an adverse local long-term moderate impact on park management and operations.

Compared to the cumulative impacts expected under the no action alternative, these differences in relation to the past, present, and future effects of encroaching development would result in a slight measurable difference. This alternative would provide a small incremental contribution to overall cumulative impacts.

### *Conclusion*

In the Northeast Corner Planning Area, changes under alternative B would be similar to alternative A, but three loops (instead of one) and three access points would be created. Overall, in the long term, impacts would be adverse, local, long-term, and negligible. In the Northwest Planning Area, changes would also be similar to alternative A, but the ADA interpretive trail to the CCC camp would permit horses along the southern leg only. Impact levels under alternative B would remain the same as alternative A: adverse, local, short- and long-term, and moderate. In the South Central Planning Area, impacts from new trail opportunities would be adverse, local, long-term, and negligible. Changes at the East Boundary Planning Area would include additional trails and access points, and bicycles would be allowed on the Belmont Trail. Overall, impacts under alternative B would remain the same as alternative A: adverse, local, long-term and moderate. Cumulative impacts would be adverse, local, long-term, and moderate.

## Preferred Alternative Analysis

### *Northeast Corner Planning Area*

Actions in the preferred alternative would be similar to alternative B, except there would be reduced demand for management and operations. Two loops would be included under the preferred alternative, instead of the three described under alternative B. Additionally, the trail proposed under alternative B that parallels the park boundary would not be included. Demand on park resources would not be readily noticeable, and impacts would be adverse, local, long-term, and negligible.

### *Northwest Planning Area*

Actions in the preferred alternative would be similar to alternative B; in addition, Cactus Wren and Manville Trails would be converted to hiker and equestrian use. Associated impacts on park operations and maintenance would be readily apparent and would be the same as alternative B: adverse, local, short- and long-term, and moderate.

### *South Central Planning Area*

As in alternative A, under the preferred alternative, Picture Rocks Wash would connect with Prophecy Wash, and Bajada Wash would connect with Dobe Wash. Like alternative B, a new trail would be constructed from the visitor center to the southwestern park boundary to connect with the proposed Central Arizona Project Trail; a new ADA compliant trail would loop off of this trail. Also as in alternative B, Wild Dog Trail would remain. However, under the preferred alternative, it would be converted to hiker and equestrian use. At Signal Hill, horses would be rerouted, and the picnic area trail would be converted to hiker only as well. As a result of the conversion of Wild Dog Trail, conflicts may increase on this trail, thereby increasing the need for enforcement. Overall, impacts under the preferred alternative would be slightly noticeable and would be adverse, local, long-term, and negligible.

### *East Boundary Planning Area*

Under the preferred alternative, changes to the East Boundary Planning Area would be similar to alternative B. Impacts would be adverse, local, long-term, and moderate.

### *Parking Areas*

Impacts associated with parking under the preferred alternative would be the same as described under alternative A: beneficial and adverse, site-specific, short- and long-term, and negligible.

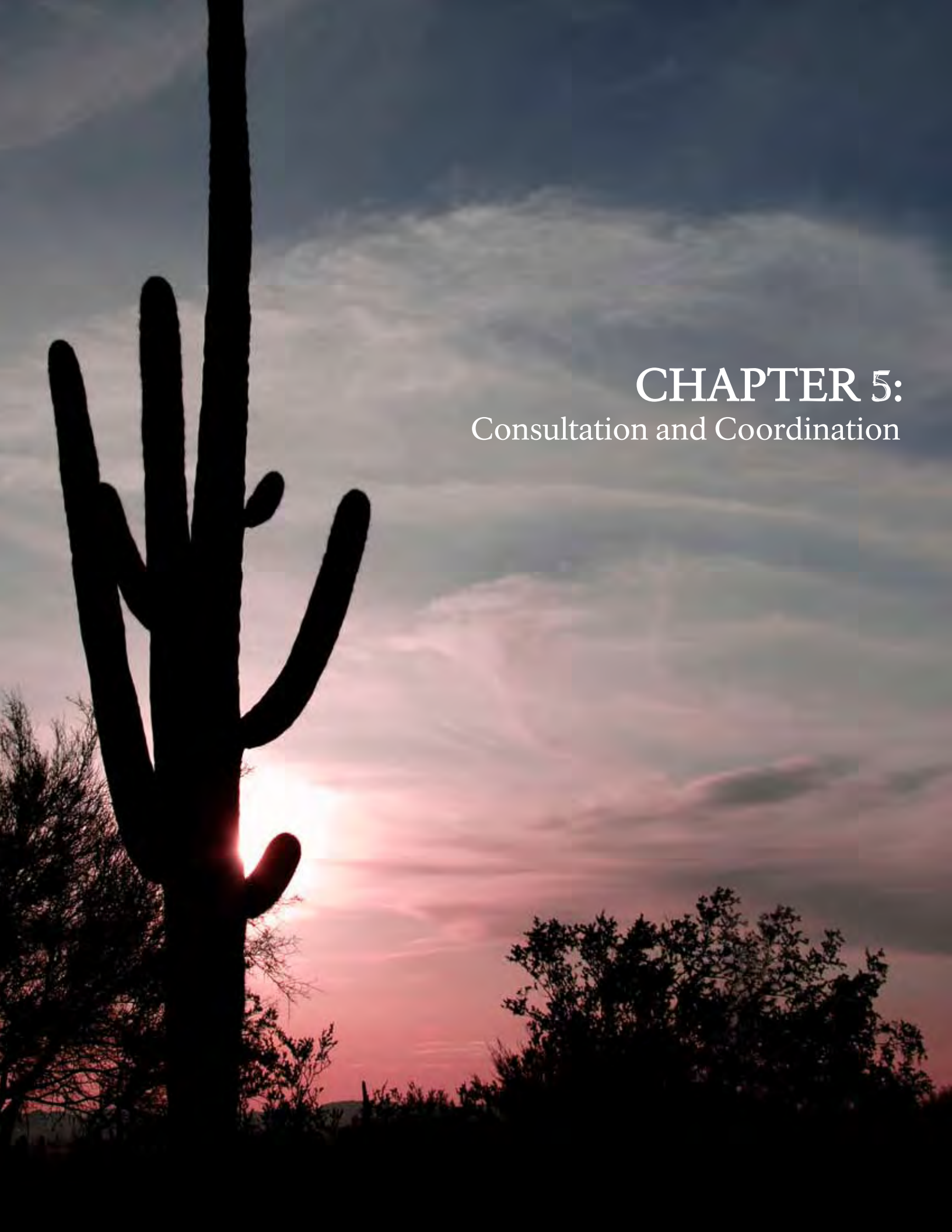
### *Cumulative Impacts*

The same scenario of past, present, and reasonably foreseeable future actions described under the no action alternative would also apply to the preferred alternative, with some differences in certain areas. Most of the differences under the preferred alternative compared to alternative A would be so slight as to result in no measurable change to cumulative impacts (e.g., providing two new trail loops in the Northeast Corner Planning Area instead of one). Combining increased access and new trails with increasing development would be an adverse local long-term moderate impact on park management and operations.

Compared to the cumulative impacts expected under the no action alternative, under the preferred alternative, these differences would be so small in relation to the past, present, and future effects of encroaching development as to result in no measurable difference. Cumulative impacts would be adverse, local, long-term, and moderate. This alternative would provide a small incremental contribution to overall cumulative impacts.

### *Conclusion*

In the Northeast Corner Planning Area, changes under the preferred alternative would be similar to alternative B, but two loops would be retained instead of three. Impacts would be adverse, local, long-term, and negligible. Impacts in the Northwest Planning Area would be the same as alternative B: adverse, local, short- and long-term, and moderate. In the South Central Planning Area, impacts would be the same as alternative B: adverse, local, long-term, and negligible. In the East Boundary Planning Area, impacts would also be similar to alternative B. Impacts would be adverse, local, long-term, and moderate. The parking areas proposed under alternative A would also be proposed under the preferred alternative. Impacts would be beneficial and adverse, site-specific, short- and long-term, and negligible. Cumulative impacts would be adverse, local, long-term, and moderate.



# CHAPTER 5:
## Consultation and Coordination

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## *Public and Agency Involvement*

The Saguaro National Park Comprehensive Trails Management Plan/EA represents thoughts of the National Park Service (NPS)/park staff, cooperating agencies, and the public. Saguaro National Park contacted the U.S. Forest Service (USFS), Bureau of Land Management (BLM), Arizona State Land Department (which administers Arizona State Trust Lands), Catalina State Park, Colossal Cave Mountain Park (a Pima County park), and Pima County to become cooperating agencies. All of these agencies have signed agreements to be cooperating agencies. Consultation and coordination among these 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 workgroup committees.

### 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 3,200 names and addresses was compiled that consisted of members of governmental agencies, organizations, businesses, legislators, local governments, and interested citizens.

In September 2005, a newsletter was mailed to interested and affected parties that introduced a general overview of the trails planning process for which the *General Management Plan* (GMP) was described as the umbrella and foundation for the trails planning vision.

In February 2006, the second trails newsletter (General Management Plan Preferred Alternative / Trails Plan Scoping - Newsletter Four) was mailed to approximately 3,200 interested and affected parties on the GMP and Trails Plan mailing lists. This newsletter included an update of trails planning associated with the GMP and began the trails planning scoping process by soliciting comments on trails issues.

On June 15, 2007, the park announced that three alternatives for trail systems in each district were available for review and comment until July 28, on the NPS Planning, Environment, and Public Comment (PEPC) website. Letters were mailed to approximately 3,200 interested and affected parties; a website address was provided indicating where to find the alternatives maps, other maps and materials, and instructions on how to comment.

Also during this public review period, the NPS conducted three open house meetings on the trails alternatives in the Tucson metro area (June 26–28, 2007). Participants on the mailing lists were sent notice of the meetings, and a meeting notice was posted in local newspapers. The public was invited to talk to NPS staff regarding proposed actions on trails that were depicted on maps and various handouts and were given the opportunity to express or leave written comments at the meeting, mail in comments at a later date, or comment online.

- The June 26 meeting was held at Magee Middle School and was attended by 100 individuals, largely interested in the Rincon Mountain District (RMD) trails.
- The June 27 meeting was held at Picture Rocks Intermediate School and was attended by 26 individuals largely interested in Tucson Mountain District (TMD) trails.
- The June 28 meeting was held at the Pima County Parks and Recreation Natural Resources Building and was attended by 31 individuals.

The NPS received 253 individual pieces of correspondence, form and non-form, which contained a total of 590 comments on the trails plan alternatives. One petition was received which contained 40 signatures.

- Form Letters – Fifty-five form letters were received. A form letter is defined as a letter containing content that is largely identical to other letters. In general, there was one form letter that focused on trails in the RMD. This letter stated general opposition to trail closures and suggested an "alternative C" be chosen instead of the alternatives A, B, or No action. A few variations of another letter for the TMD were received that suggested the No Action alternative be adjusted to show other existing trails.
- Non-Form Letters – Non-form letters include mailed individual or personalized letters, comment forms received at open houses, comment forms that were sent to the NPS through the mail, and letters or comments received on the PEPC website. The NPS received 198 non-form letters during the comment period. Comments from these letters were incorporated into the comment analysis. Many letters contained multiple comments on a variety of topics, while some letters focused on one trail or aspect of the planning process.

The following summarizes comments received from the June 2007 mailings and open house meetings:

- Agreement with proposed alternatives: A majority of individuals expressed agreement with one of the alternatives presented (alternative A, B, or no action). Some were in general agreement with an alternative but offered variations to the alternative, such as a different access point or trail. For the RMD, a majority of those who preferred alternative A were in favor of the proposed Arizona Trail route through the park or other newly proposed trails. Many of those who preferred alternative B liked the greater number of trails the alternative offered compared to alternative A. In the TMD, a majority of commenters preferred alternative B because they felt it would provide more access and trail options than alternative A. Some preferred the No Action alternative because they preferred the status quo.
- Don't Close Trails: Comments on trail closures focused mainly on the Cactus Forest Planning Area of the RMD. Many individuals were opposed to closing trails. Many individuals did not want any trails to be eliminated and suggested that the NPS open more trails. Others opposed the closure of a certain trail or trails. Some felt that redundant trails still offered a different visitor experience or opportunity and should be kept open. Many felt that trail closures would lead to greater congestion on the trails that would remain open.
- New Access Points, Trails, or Trail Connections: Some respondents wanted more access points into the park than currently exist. Many comments focused on the location of additional access points. Many commenters suggested new ideas for trails or trail connections. A majority of comments expressed agreement with a proposed trail or connection in alternative A or B. Others suggested specific new trail connections and access points.
- Visitor Conflicts and Safety: Some commenters were opposed to mountain bicycling because of resource issues and visitor conflicts. Some felt that mountain biking should not be an allowable use in national parks. Some were opposed to horses on hiking trails or thought that horses should be eliminated from the park due to resource, visitor experience, and sanitation issues. Others felt that more trails should be hiking only, or that horses should be restricted to washes only. Others felt that riders should be required to clean up after their horses. Many equestrians and some hikers were opposed to the existing rock steps found in the Cactus Forest Planning Area. Many thought that the steps were a safety hazard. Some also felt that they are incompatible with wilderness character. Other safety issues included parking and pull out concerns at some access points, or the need to park and cross busy roads to access a trailhead.
- Maintenance/Management Issues: Many individuals commented on the need to maintain or close trails that had extensive maintenance issues. Some suggested that trails be rerouted. Other issues

include safety of parking pullouts, safety issues associated with the lack of parking facilities, the need for restroom facilities at trailheads, and the need for adequate trail signs. Some individuals suggested that all users should be required to pay a fee to use trails so that they could be adequately maintained.

- Close Trails: Some individuals were opposed to the creation of social and connector trails that were not designed with any standards, and they thought that these trails should be closed. Some wanted more closures than what was proposed in either alternative A or B. Others cited the need for trail closures because of resource concerns or continuing maintenance problems associated with poor design. Many respondents suggested very specific trail closures or closure of certain trail segments.
- Natural and Cultural Resource Issues: Many respondents thought that trails should be closed or rerouted because of erosion, poor design, or lack of trail design. Some suggested trails be closed or rerouted to avoid sensitive resources. Some thought there should be fewer trails in some areas to protect sensitive natural and cultural resources or maintain a wilderness experience. Others cited a specific use (i.e., horse use, mountain bike use) as the principle cause of erosion. A few individuals were concerned that some specific trails, both existing and proposed, would result in increased impacts on archeological sites.
- Other Visitor Experience/Opportunity Issues: Many were in favor of the proposed ADA accessible trails. Some felt that more ADA trails were necessary. Many individuals mentioned the desire to walk or ride trails that included loops instead of out and back routes. Several hikers suggested retaining some smaller loops for those who did not want to hike for hours. Others wanted to retain wilderness character and the feeling of solitude and natural quiet that wilderness should offer. Others felt that all washes should remain in the trail system and suggested that wildlife are not threatened by human presence. Some wanted more opportunities for hiker only trails.
- Use Volunteers: Many respondents suggested the use of volunteers to repair trails that need maintenance. A majority of the comments associated with volunteer help were associated with the RMD, where volunteer help was suggested as a way to repair eroded trails in lieu of closure. Some suggested instituting a volunteer program to assist with trail maintenance year round.
- Consider a New Alternative: Some respondents suggested a new alternative for the RMD. A majority of the form letters received suggested that the NPS should examine “alternative C” as presented by an organized group. The NPS considered this alternative and analyzed the impacts of the proposed actions in this trails plan.

The alternatives were revised and constructed with careful consideration of public comments and the objectives of this trails plan. The alternatives include a number of different ideas presented by the public during public comment periods.

Comprehensive Trails Plan Newsletter Three (Newsletter #3), dated February 2008, was mailed to approximately 3,200 individuals on the Saguaro National Park GMP and Trails Plan mailing list. This newsletter provided a summary of public comment on the alternatives. The public was provided a 30-day comment period. 48 comments on Newsletter #3 were received.

## Saguaro National Park Trails Workgroup Committee

The NPS wanted to hear from a wide variety of trail users and capture the public’s thoughts on ideas for new trails as well as issues and other concerns about existing trails. To address this need, the NPS contracted with the Rincon Institute, a nonprofit conservation organization founded in 1991 to help protect the natural resources of Saguaro National Park East and adjoining lands. The Rincon Institute was tasked with helping to assemble a trails workgroup and facilitating and managing 10 trails workgroup

meetings. The purpose of the trails workgroup was solely to exchange views, information, or ideas relating to trails management and implementation of a trails plan.

The Rincon Institute contacted all of the various hiking, equestrian, cycling, environmental, and neighborhood groups associated with the park and asked the interest groups to work within their particular interest to self-select two members from each user group to represent them in the trails workgroup.

The 12 seats on the workgroup consisted of an equal representation of hiking, equestrian, cycling, environmental, and neighborhood interests. The workgroup also included two "at large" members. The Rincon Institute final report, dated August 28, 2006, summarizes participants, agendas and results and is included in appendix C.

## Consultation with Other Agencies, Officials, and Organizations (to date)

## U.S. Fish and Wildlife Service

The Endangered Species Act (ESA) 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 September 2008, 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 NPS has consulted the U.S. Fish and Wildlife Service (USFWS) website. Copies of the three newsletters also were provided for the USFWS, and the agency will be given a copy of this document for review. A biological assessment of the effects of the plan on threatened and endangered species in the park has been submitted to the USFWS. Determinations can be found in "Chapter 4: Environmental Consequences."

## Consultation with Native Americans

The NPS 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 to 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* (NHPA) of 1966, as amended. Implementing regulations of the Council on Environmental Quality (CEQ) for the *National Environmental Policy Act* (NEPA) of 1969, as amended, also calls for Native American consultations.

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 RMD. 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 explanation 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 means of education, including law enforcement.

In compliance with Section 106 of the NHPA and the NEPA, a letter was sent in December 2008 to interested Native American tribes which introduced the trails plan.

Copies of the three newsletters also were provided for interested Native American tribes, and the tribes will be given a copy of this document for review. These tribes include: 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, the Tohono O'odham Nation, and the Pueblo of Zuni.

## 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 NHPA 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 (NRHP). Saguaro National Park superintendent Sarah Craighead informed the Arizona state historic preservation officer (SHPO) by way of a letter dated August 22, 2008 about the Comprehensive Trails Management Plan which examined the issue of National Register eligibility for the existing trails with a Determination of Eligibility (DOE) for SHPO review. In addition, Saguaro National Park has prepared a specific programmatic agreement (PA) between the NPS, the Advisory Council on Historic Preservation (ACHP), and SHPO which encompasses compliance on what is presented in the Comprehensive Trails Management Plan.

### Consultation with the Arizona State Historic Preservation Officer on the Preferred Alternative

Under terms of stipulation VI.E of the 1995 PA between the NPS, the Advisory Council on Historic Preservation (ACHP), and the National Conference of State Historic Preservation Officers, the NPS will work in consultation with the SHPO. 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.

## *Agencies, Organizations, and Individuals Receiving a Copy of this Document*

A list of agencies, organizations and individuals receiving a copy of this document is available at the park.

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# APPENDICES

## List of Appendices

# APPENDIX A: 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 (ADA)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 B: VISITOR CARRYING CAPACITY

| 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<br><br>2. Number of groups encountered per day (6 hours) along designated trails | 1. Mean trail width will not exceed 36 inches<br><br>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<br><br>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)<br><br>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<br><br>2. Number of people encountered every two hours along designated trails | 1. Mean trail width will not exceed 36 inches<br><br>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<br><br>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)<br><br>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<br><br>2. Number of people encountered per hour along designated trails | 1. Mean trail width will not exceed 36 inches<br><br>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<br><br>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)<br><br>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

** Because of the high volume of use on Douglas Spring Trail due to 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."

# APPENDIX C: SAGUARO NATIONAL PARK TRAILS WORKGROUP FINAL REPORT

Rincon Institute
August 28, 2006

CONTENTS



**BACKGROUND**

Saguaro National Park is currently finishing up the general management planning process. As a part of this process and in response to overwhelming pressure from the trail community, the park requested they begin the trails implementation planning process prior to the management plan being final.

To do this, the National Park Service (NPS) and Saguaro National Park (SAGU) wanted to hear the concerns of various organizations regarding trails and trail facilities, trail conflicts, or any other concerns that may be applied to the trails planning process. To address this need, SAGU contracted with the Rincon Institute to facilitate and manage a “trails workgroup” that would be representative of the various user groups and would work together to address the trail issues specific to both the east and west units of SAGU.

The purpose of the trails workgroup was solely to exchange views, information, or advice relating to trails management and implementation of a trails plan. The purpose of the group was ***not*** to vote on ideas or to arrive at a consensus on any decision that needs to be made. This process allowed the NPS to share with the group its park mission, laws, mandates, planning policies, and other policies that guide trail and trailhead type, location, and maintenance.

The workgroup members were tasked with communicating the information and discussions from each meeting back to their group(s), and each member was encouraged to provide individual input, as opposed to group input, and various members of the organization being represented was encouraged.

The process for the meetings separated the two units of the park into planning areas, and each workgroup meeting focused on a planning area (see attached planning area maps). SAGU had time at the beginning of each meeting to inform the group of immediate and ongoing challenges in trail design, trail maintenance, social and redundant trails, and related natural and cultural resource

concerns. The workgroup was dissolved after all the planning areas were complete and once the NPS felt adequate information had been exchanged during the trails planning process.

It was made clear on the first workgroup meeting that the park Superintendent is responsible for selecting the preferred alternative for the trails plan. The preferred alternative is not only based on public and other agency input, but it is shaped by laws, regulations, policies, and the fiscal and operational realities that parks face at this time. In addition, the NPS cannot delegate its decision making authority to a council (*NPCA et al. v. Stanton et al.*, Niobrara National River lost a court challenge because it unlawfully delegated its statutory management duties to an appointed council, and the court ruled that the council's dominant private local interests were likely to conflict with national environmental interests that the NPS is statutorily mandated to represent).

The Rincon Institute worked with SAGU and the local trails community to contact the user groups and gather the workgroup members, coordinate the meetings, keep and distribute meeting minutes, facilitate meetings, set up meeting rooms, communicate workgroup materials and agendas, and maintain contact with workgroup members as necessary.

The process was open and transparent. Each of the meetings were advertised on email to a list of trail group representatives and each of the workgroup members was expected to communicate meeting content and agendas to interested parties. There was a press release by the park service and a news article in the local paper about the meetings.

# PARTICIPANTS

**Member Selection**

The Rincon Institute, with input from the SAGU and the NPS, established a certain number of seats on the workgroup that consisted of an equal representation of hiking, equestrian, cycling, environmental, and neighborhood interests. The ideal workgroup size would be 10-15 people, the final group was 12. Rincon Institute did not hand pick any individuals or organizations that would serve on the workgroup. Rather, the Rincon Institute contacted all trails interest groups associated with Saguaro National Park and informed the groups (hiking, biking, equestrian, etc.) of the number of seats that they collectively have as an "interest" on the workgroup. The interest groups were allowed to have different individuals represent them at meetings, but were made aware that the meetings would be a succession of education and information exchange, and each will build off of the previous one. Most members remained the same individual throughout the entire process and found an alternate in the case they needed to take an absence.

A technical committee was established by SAGU and the various interest groups. The technical committee consisted of necessary park

representatives, representatives from Pima County, Rincon Institute, and adjacent neighborhood interests.

**Workgroup Representatives**

1. Sue Clark, Pima Trails Association, PO Box 35007, Tucson, AZ 85719, sue8413@aol.com, 887-8413
2. Linda Anderson-McKee, Urban Trails Coalition, 7850 S. Rincon Valley Ranch Road, Tucson 85747, fredmckee@worldnet.att.net, 647-3899
3. Dave Hicks, Arizona Trail Association, 1220 E. Gardenia, Phoenix, AZ 85020, dhicks15@cox.net, 602-371-3726
4. Ken Kunkle, 6745 E. Calle de Mi Jazmin, Tucson, AZ 85743, Kunkle@msn.com, 977-9205
5. Fran Haggerty, Saguaro Horsemen, tfhaggerty@cox.net, 749-3875
6. Pete Cowgill, PO Box 5821, Tucson, AZ 85703, Southern Arizona Hiking Club, ATC@sachinfo.org 887-1514
7. Mike Headrick, 13308 E. Placita el Algodon, Tucson, AZ 85749, Hiking and Cienega Corridor Conservation Council, mbheadrick@aol.com, 760-0745
8. Tom Gormley, 318 N. Fremont Ave Tucson,Az 85719, Trail Runners Association, tommydangerboy@gmail.com
9. Randy Accetta, 2416 E. 4th St, Tucson AZ 85719, Southern Arizona Roadrunners, raccetta2@cox.net, 991-0733
10. Jon Shouse, 6538 E. Calle Capella, Tucson, AZ 85710, Mountain Biking, jonshouse@cox.net, 750-8222
11. Mark Flint, 6364 N. Camino Hermosillo, Tucson, AZ 85718, MTBAcess, markflint@earthlink.net, 299-9151
12. Ken Langton, 13675 E. Camino La Cebadilla, Tucson, AZ 85749, Sierra Club, kplangton@msn.com, 749-3829

Technical Committee

1. Sarah Craighead, Superintendent of Saguaro National Park, sarah_craighead@nps.gov, 733-5101
2. Steve Anderson, Pima County Parks and Recreation, steve.anderson@pima.gov, 877-6206
3. Nancy Osgood-West, Saguaro National Park Volunteer, triangleW@msn.com, 647-3785
4. Peter Backus, Coyote Creek, pbtrading@cox.net, 647-0030
5. Jeremy Curtis, Saguaro National Park, Jeremy_curtis@nps.gov
6. Barney Riley, National Park Service, barney_riley@nps.gov

# MEETINGS

Agendas and Dates

Meeting number 1
January 24, 2006

- Introductions and Ice Breaker (30 min.)
- General Management Plan (GMP) overview (10 min.)
- Trails Implementation Plan purpose and history (10 min.)
- Goals and Purpose of the Trails Implementation Plan Workgroup (5 min.)
- Trails Etiquette (Ground Rules) (5 min.)
- Logistical Planning (15 min.)

Meeting number 2
March 21, 2006

- Introductions (5 min.)
- Discussion of the General Management Plan (GMP) Preferred Alternative (15 min.)
- Trails Implementation Plan Group Q&A (15 min.)
- Background Information on Planning Area #1 (15 min.)
- Idea Generation for Planning Area #1 (35 min.)
- Logistical Planning (5 min.)

Meeting number 3
April 5, 2006

- Introductions (5 min.)
- Rubric for Prioritization discussion? (5 min.)
- Hand-out information materials (5 min.)
- Discussion of Visitor Use and Trails Plans (20 min.)
- Continue idea generation for planning area #1 (50 min.)
- Logistical Planning (5 min.)
- Call to Audience (5 min.)

Meeting number 4
April 18, 2006

- Introductions (5 min.)
- Review background information for Planning area #2 (10 min.)
- Idea Generation and Discussion for Planning area #2 – Rincon Mountain District “Foothills and Mountains area” (60 min.)
- Logistical planning (5 min.)
- Call to Audience (10 min.)

Meeting number 5
May 3, 2006

- Introductions (5 min.)
- Information on Planning Area #3 (15 min.)
- Idea Generation for Planning Area #4 (55 min.)
- Call to Audience (10 min.)
- Logistical Planning (5 min.)

Meeting number 6
May 16, 2006

- Introductions (5 min.)
- Finish Idea Generation for Planning Areas #3 and 4 (35 min.)
- Information on Planning Area #5 – Southern Boundary in RMD (15 min.)
- Begin Idea Generation for Planning Area #5 (10 min.)
- Call to Audience (10 min.)
- Logistical Planning (15 min.)

Meeting number 7
May 24, 2006

- Introductions (5 min.)
- Information on Planning Area # 6 (15 min.)
- Idea Generation for Planning Area #6 (60 min.)

- Call to Audience (10 min.)

Meeting Number 8
May 31, 2006
- Introductions (5 min.)
- Idea Generation continued for Planning Area #5 (70 min.)
- Call to Audience (10 min.)

Meeting number 9
June 14, 2006
Introductions (5 min.)
Information on Trails Suitability Procedures (15 min.)
Idea Generation for Planning Area #7 (60 min.) – Manning Area RMD
Call to Audience (10 min.)

Meeting 10
June 21, 2006
- Introductions (5 min.)
- Continue Education on Cactus Forest Planning Area (15 min.)
- Idea Generation for Cactus Planning Area (55 min.)
- Call to Audience (10 min)
- Logistical Planning (5 min.)

**SUMMARY RESULTS**

Meeting 1:

Workgroup members participated in an ice breaker and activities for team-building, getting to know one another, focusing on the goals and objectives of this group, and assessing the group knowledge of the trail system. Workgroup members (members) identified their favorite trails and important trail characteristics. They also identified their hopes for the process. These included remoteness, rural, accessible to mountain bikes, accessible in general, varied ecology, scenic perspectives, beauty, wildlife, challenge. The second ice breaker demonstrated that the group shares many values and accesses many of the same trails and that the group has some learning to do as many of the group members thought their favorite trails were in the park, but in fact they were on other public lands.

The GMP history and trails planning process was explained including the process of scoping, creating alternatives, and choosing a preferred alternative. The GMP is an overarching plan and the trails plan is an “implementation plan” that focuses on a particular program of the park’s management. The workgroup was created at this time because the park wanted to address the trails issue as soon as possible. Typically the implementation plans are done after a preferred alternative is chosen; the park asked for special permission to call for this group to meet earlier than normally allowed in response to the high volume of calls and letters the park was receiving regarding trails.

Meeting 2:

Park staff explained some of the issues they want to address with the Tucson Mountain District (TMD). These include Picture Rocks

road traffic calming, the visitor loop, the King Canyon Trailhead, the gasline right of way, the valley view overlook, and the CCC area. The Rincon Mountain District issues for discussion included the Madrona area, Manning Camp, the State Trust Land and Hope Camp. This was not an exhaustive list. There was a question and answer session about the workgroup purpose and goals. The group was not to strive to reach consensus rather to only share ideas, how each planning area would be addressed, and some clarifications about process and NEPA and FACA.

Mark Holden presented to the group about the history and current issues in Planning Area #1 – the northwest section of TMD. Some of the issues included adjacent development pressures, roads and traffic, loss of habitat and buffer lands, and introduction on nonnative and invasive species. Following discussion around park/growth impacts, the group focused on the specific trails in the planning area. Highlights of this discussion: suggested removing the trail near/parallel to the road in the Manville area, access concerns resulting in fence cutting and social trails – suggestions for trailheads in those areas, inadequate parking for equestrian trailers.

Meeting 3:

There was a brief discussion about using a rubric to help organize opinions of the group. The rubric uses “scoring” so it was not used for concern it might not fit under FACA. Rather the group will use a “pro and con” method of organizing opinions for each topic and idea. Visitor use data information and maps were handed out (see additional materials) and there was discussion around special places and favorite areas.

Planning area #1 discussion continued and included the following ideas: difficulty crossing Picture Rocks road and with the trailhead parking in that area; limited access if Golden Gate area is closed; concerns about budget and trail maintenance; traffic slowing methods; trail connection at Prophecy Wash; a Golden Gate trailhead; the Encinas Trail and vegetation; Camp Pima and CCC area and the possibility of improved access and regional connectivity to the Central Arizona Project trail (CAP) trail; and an interpretive trail in Camp Pima.

Meeting 4:

Focus was on Planning area #2, the Foothills and Mountains area of the Rincon Mountain District (RMD). Park staff presented the history and issues with the planning area. There is Mexican spotted owl habitat in this area, much of the area is wilderness and is high in archeological value. There are issues with grazing, hunting, and OHV use impacting the resource. Visitor use data was utilized for this area and the trails plan from the early 1990s was handed out as well. The Arizona Trail was addressed in terms of its current location south of the RMD park boundary and there is interest in connecting it through the park there. Trail maintenance was a concern as many of these trails are backcountry and more difficult to get to and manage. A volunteer program to assist the park with trail maintenance was also mentioned.

The group generated the following thoughts and listed pros and cons for each idea: an easement for the road on the east portion of the planning area. This was a non-controversial section and the group did not identify other issues.

Meeting 5:

Park staff announced the Cactus Loop Road closure and repaving. Focus area for this meeting was planning areas 3 and 4, a small area in the northeast and south and central area of TMD. Park staff presented history and current issues with these planning areas. There are CCC areas, archeological sites, some social trails and fence cutting. There was frustration expressed about trail signage and the value of making official trailheads and trails to decrease social trails. There was also concern that the trails crossing state land inside the park boundaries were not allowed to be included in the map.

Idea generation (see minutes for pro/con discussion): easement across state land for trails; new King Canyon trailhead - park partner with the county; facilities at the King Canyon TH; equestrian access along King Canyon trail – alternate route; steps on the Hugh Norris trail; connectivity to CAP; new trail in southwest corner – linkage to CAP and loop to connect to visitor center and discovery trail. The call to audience reminded members that there are easements being worked on for the old Sweetwater Trail, and people would like access on the east boundary.

Meeting 6:

Focus was on planning area 3 and 4 to finish discussion and begin thoughts on planning area 5, the Southern Boundary in RMD. Continued ideas on planning areas 3 and 4: re-route of Cam-Boh away from traffic; connecting Prophecy Wash and Picture Rocks trails; create a new trailhead with parking at Golden Gate and Picture Rocks road junction; increase amount of directional signage – showing visitors where trails are; connection to CAP on north side perhaps easier than southwest corner.

Park staff presented information for planning area 5, the southern boundary in RMD: nearby development and growing area adjacent to this area; local preserves that help support resource protection; designated wilderness; state trust lands inside park boundaries; only one designated trail in this area and no off-trail travel allowed; private access road into Madrona. Significant resources are associated with the Madrona Pools area, and park staff highlighted those ecological values for the group and park concerns with impacts to and protection of those resources. There are controversial issues about people wanting access to these spectacular pools and the park wanting to ensure their health and long-term viability. Access is desired from the south end of RMD towards the north – whether it goes through/near the pools or not is another issue and discussed in another planning area.

Group generated ideas: open a trail from the Deer Camp/Hope Camp Trail up to the north towards the pools and then tying into the Madrona Trail there; open a trail from the Coyote Creek/Rincon Creek intersection into the park; open a trail from further south on Camino Loma Alta up through the canyon to the Hope Camp Trail;

Meeting 7:

The focus for this meeting was planning area #6, the East Boundary of TMD. Park staff gave an overview of the area: there are a lot of private lands in this area, and the UA Desert Station is in this area; rapid development adjacent to this area; adjacent to Tucson Mountain Park – a county preserve; six miles of designated trail with much more social trail; fence cutting problems. The group began idea discussion for this area.

Ideas included: Sweetwater Trail maintenance and re-opening some of the old access points; Camino del Cerro trailhead facilities; new trailhead in the northeast corner of the park; working with adjacent private landowners to trade/sell/donate easements for better trail routes; designate social trails best for the resource to create a loop around Panther and Safford peaks; official access points to reduce illegal access; meet with specific local users to define control points and determine how to best meet park service and neighbor needs; reducing or getting rid of the wasteful or high density trails; use of the gas line for bike use;

Meeting 8:

Focus for this meeting is planning area #5, the Southern Boundary (also known to some as Madrona area) in RMD. There was a brief update about the Northeast Corner of TMD and the access points there that currently exist. A suggestion to make an official access point along Scenic Drive was discussed.

A member of the technical committee explained that park volunteers in the past have worked with park staff to identify possible routes in this area that could connect Hope Camp Trail north to the Manning Trail, enabling an access from the southern boundary to the north of the park. Members suggested and discussed five trail route suggestions for this south to north connection. These ideas each included a discussion about the pros and cons of the suggestion and impacts on the resource was considered in each idea. The ideas include: route from Hope Camp north and east along the foothills to Madrona and intersect with Manning Trail at Madrona; a similar route from Hope Camp to Manning Trail but located further to the west to avoid the pools; creation of a connection to Tanque Verde Ridge Trail from Hope Camp and Camino Loma Alta trailhead; move or add to the AZ Trail to have it go up Happy Valley or through Miller Creek to avoid the Rincon Creek area altogether; use both of the suggested routes to Manning Trail and make a loop; and routing a trail north from the Colossal Cave Mountain Park area through the forest service lands and to the Rincon Creek Trail east of the pools – connect at Papago Springs and use an old road bed to move north onto the ridge. The Deer Vista Trail was also discussed.

Meeting 9:

Focus for this meeting is planning area #7, the Manning Camp area in RMD. Park staff explained the Trails Suitability Study and how it can be applied to help park staff and others make decisions about the trails and trail planning. There was extensive discussion about the suitability model and use.

Members of the workgroup listed the following ideas: keep the east branch of the north slope open despite trail suitability; suggest trail armoring and re-routes where the suitability assessment is negative; stop the use of the stone steps; maintain the backcountry trails as backcountry.

Meeting 10:

The last meeting. Focus is on planning area #8, the Cactus Forest area in RMD. The complexity of this area was recognized up front, and the group was asked to focus on trails for possible re-route, trails to stay the way they are; trails for possible closure; and amenities.

Park staff provided an overview for the area: history and background of the area, how the trails came to be, the impacts, and the former use; the park realizes the trails are important, but also is concerned at the density of trails and confusion along with the need to balance new trails with existing trails; incredible archeological sites in this area; residential use of the area; visitor use high due to number of trails and nearby guest ranch; visitor carrying capacity; impacts from the nearby growing community;

Idea generation: keep trails open to accommodate the users; limiting number of trail users; re-routing trails; fixing Douglas Spring Trail; segregate trail use; provide more and better signage at the trailhead to encourage more diverse and dispersed use; limit people on the trails; increase access points (Speedway and Shatz trail area, Freeman road, Broadway); Irvington Gate is unsafe.

**MAPS OF PLANNING AREAS**

Planning Area Rincon Mountain District (EAST)
Planning Areas Tucson Mountain District (WEST)

**MINUTES**

**See attached meeting minutes**

**ADDITIONAL MATERIALS**

- Internal Scoping meeting notes
- Workgroup member notebook materials
    - Cover page, goals, ground rules, representative list, and technical committee list
- Issues Associated with achieving trail objectives document
- Questions and Answers for 3/22/06
- Trail Statistics document
- Trail use intensity maps East and West
- Special Places maps East and West
- Trail Count Summary East and West
- Length of Stay information for visitor use
- Counters and Simulation Data
- Trails Suitability document
- Guidelines for the Saguaro Trails Plan Workgroup document
- Saguaro National Park General Management Plan newsletter #3 May 2005

# APPENDIX D: CRITERIA FOR DESIGNATING WASHES AS TRAILS

**Criteria for designating washes as trails**
**March 21, 2007**
Matt Daniels
Don Swann
Natasha Kline

Items I.- IV. below are resource related concerns/criteria that we identified regarding the use of washes as trails in the Rincon Mountain District's (RMD) designated trail system.

I. SLOPE. Slope is an important variable in determining designated trails, for both safety and resource protection reasons. In the RMD, washes begin as drainages from the Rincon Mountains. They are usually quite steep and narrow, and have a bedrock substrate strewn with rubble, until they level out (around 2850" elevation) in the bajada areas/Sonoran Desert below. Above that elevation, these drainages are slippery and rocky and not appropriate for hiking trails. They also contain the park's most precious resource – water, in their bedrock tinajas.

We used 18% slope (about 6.4°) to delineate the threshold for washes to be used as trails in the Cactus Forest area of the RMD. That was the maximum slope considered suitable for a trail in our "trail suitability" model.

II. SIZE. To be appropriate for use as a trail, washes must be large/wide enough to accommodate use without impact to the sensitive xeroriparian vegetation that grows along their borders. We began identifying washes as large enough for trail use by starting only with those shown on USGS topo maps (scale 1:24,000). From these, we identified washes that were 3-5m (12-25") wide using the park's orthophoto quads. Washes this size have a wide sandy substrate that protects surrounding vegetation and is not impacted by human or horse use. Note that washes are dynamic systems, and this variable is one that could change over time.

III. CONTEXT. Washes to be potentially used as trails must connect to the designated trail system. Such washes were again determined using the park's GIS data. In some cases, washes are only designated as potential trails on one side of its intersection with a trail since beyond that intersection, the wash either doesn't intersect the trail system again, or it becomes too small or too steep. For example, washes that intersect the Garwood, Carillo and Squeeze Pen trails are only available as potential trails to the north/northwest of those trails since they would "dead-end" shortly after the trail intersection due to the slope criteria. Likewise, washes that continue out of the park to the north will only be designated trails to their intersection with the Shantz Trail since they "dead-end" at the park boundary north of that.

IV. PROTECTION OF SPECIFIC, SENSITIVE RESOURCES. If a wash is known to contain specific, sensitive resources (i.e., water, or

sensitive species/cultural resources) it may not be appropriate for trail designation. For example, Wildhorse Tank is a sensitive feature that could be protected by not designating Wildhorse drainage a trail beyond Carillo Trail.

V. SOCIAL CONSIDERATIONS. These include designating appropriate types of use (i.e., hikers, horses, mountain bikes) for washes used as trails, and logistical/safety considerations, such as signage. We did not address these issues specifically.

# Appendix E: Saguaro National Park

# Trails Maintenance Handbook

**TABLE OF CONTENTS**

## Trail System Criteria

1. Cultural Resources- 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.
2. Natural Resources- Trails will be designed and located to protect important vegetation and wildlife communities that are unique to the park, help restore environmentally sensitive areas, and direct trail use to areas with suitable soils.
3. Visitor Experience- 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.
4. Park Operations- 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 front country 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.

## TRAIL MAINTENANCE STANDARDS

| Cyclic Trail & Preventative Maintenance Practices | Yearly Activities | When Present |
|---|---|---|
| Clean drainage devices (waterbars, swales, paved and stone dips, culverts, etc.) | X | |
| Clear downed logs/ cactus | | X |
| Minor Removal of berm and checking proper trail outslope for drainage | X | |
| Rehabilitation to disturbed areas including trail shortcuts and social trails. | | X |
| Remove overgrowth in trail corridor | X | |
| Restore backslope | | X |
| Replace worn structures or components of worn structures (waterbars, steps, retaining walls, or other structures | | X |

Due to the endless hiking seasons at Saguaro National Park maintenance will occur on a year round basis. Crews will be assigned trail maintenance tasks throughout the season. Often times this will be tied in with other projects or while crews hike in and out of project sites or backcountry camps.

Trail maintenance refers to the clearing and cleaning of all drainage devices, if time permits the minor repairs of rock and log drainage structures; Minor berm removal and tread outsloping; the removal of hazardous rocks which are generally rocks 3 inches or more in diameter, including large boulders; Clearing of the trail corridor including brushing back trees, cactus, and removal of downed trees blocking the trail corridor.

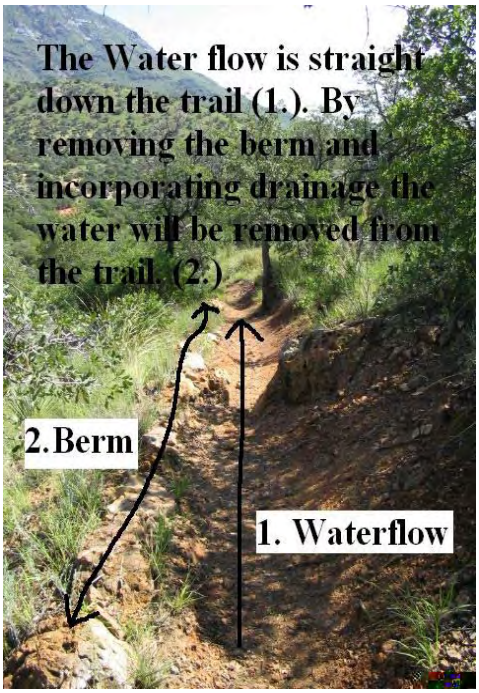
### 1. Drainage

Proper drainage maintenance is an important factor in extending the overall life cycle of the trail and structures. Drainage maintenance allows for the natural flow of water on and off the trail, and should be scheduled on a yearly basis as the summer rains quickly fill in drainages, and the winter users kick debris and soil into the drainage causing clogs and failure of the overall drainage system. With all drainage maintenance tasks it is important to do a thorough enough job to last throughout a full year of trail use.

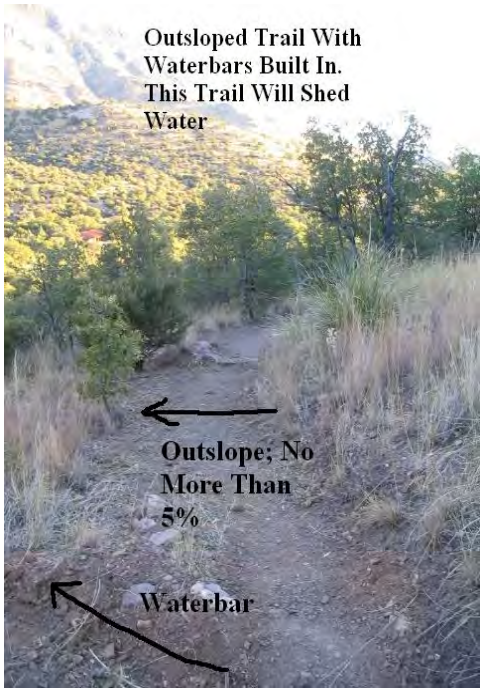
Some common drainage maintenance tasks are berm removal and outsloping of trail; installation or cleaning of swales; and the cleaning of waterbars, and other types of drains.

## Berm Removal & Outsloping

When possible the preferred method for drainage is berm removal and proper outsloping of trail tread. Berm is often caused by tread compaction and soil displacement due to normal or heavy trail use, and can be compounded by excessive erosion to the trail tread. Berm can be identified by a ridge of material formed on the outer edge of the trail, which projects higher than the center of the trail tread. This berm has the potential to alter the natural drainage and runoff patterns across and off the trail and lead to severe erosion. On occasion the berm will need to be knocked down. This is done by breaking the material up and shoveling it back into the center of the trail or on the downhill side of the trail. Once this is done it will need to be graded out to provide the proper outslope of the trail tread. Outsloping the trail tread requires the grading of material in a way that will leave the outside edge of a bench trail lower than the inside to shed water. Trail outslope should be barely noticeable to a hiker. The typical trail is outsloped no more than 5%, or 1 inch of outslope for every 18 inches of trail tread.




**Berm that needs removed.**




**Trail that has recently had berm removed**

## Swales

Swales are drains that are similar to waterbars without the bar. Dig the drains wide and extend them well off the trail. Some rules of thumb for drainage cleaning are two shovel widths wide or roughly 18 inches. A depth of approximately four inches is sufficient to move the water off the trail. The length of the drain should be long enough to not allow water to enter back onto the trail.

## Waterbars

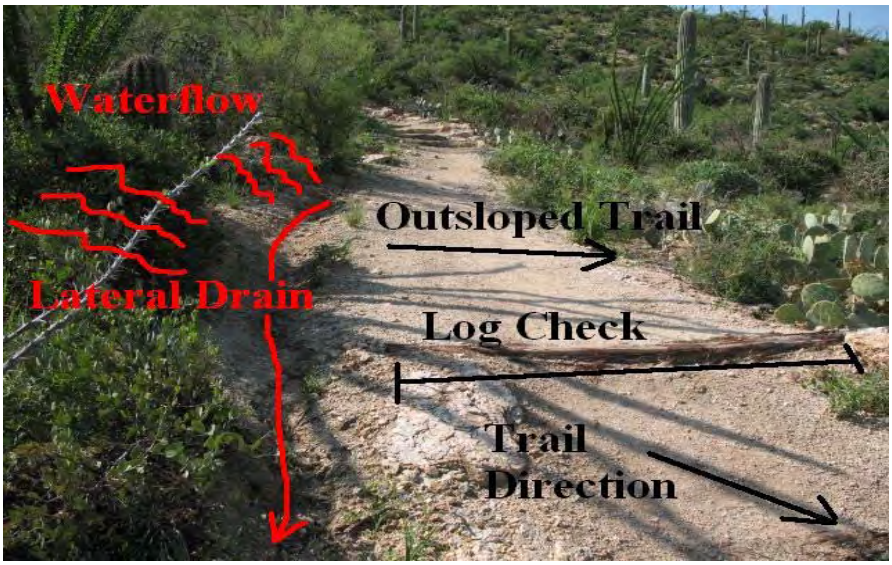
Water running downhill should never actually hit the waterbar; the waterbar is only reinforcing the actual drain. Dig the drain wide, thoroughly, and extend it well off the trail. Material should not be allowed to dam up off the trail, which would block the flow of the runoff. The drain should be dug at least 18 inches wide and 3 to 4 inches down (maximum) on the uphill side of the bar, and shaped like a funnel, or “Tear Drop.”


*Waterbar and swale cleaning description.*

The material dug out from in front of a waterbar should be placed in the trail tread behind the bar (downslope, in between the bar and step/check) and used as backing material. Any objects larger than 2 to 3 inches should not be returned to the trail tread.

## Lateral Drains

Lateral Drains are rarely used at Saguaro National Park. There are some however that requires maintenance from time to time. These drains should be cleared of debris and vegetation. Clean the drain deep enough so that water will not spill back on to the trail. Keep in mind other drainage alternatives (outsloping, waterbars, grade change, etc.) next to and below the lateral drain so that water that may spill onto the trail during flash floods will shed off the trail as quickly as possible.




*All of the components in the photo are working to keep water off the trail at a switchback corner. The Lateral Drain as a first drainage, Outslope of tread above, Log Check, and a Directional Change will all keep water off of the trail and protect the corner.*

## 2. Trail Corridor

Maintenance tasks that are included in this section are those of which most trail workers would consider as "Trail Opening Tasks." This includes logging, brushing and general clearing of the trail corridor. With trails at lower elevations we are able to complete these tasks on a year round basis, and working at higher elevations in the Spring, Summer and Fall.

**Trail Clearing**

Trail Clearing refers to the removal of rocks, downed limbs and small downed trees in the corridor, and minor slides that can all be removed as crews hike the trails to camps or on drainage and/or logging and brushing runs. Crews should never pass by downed limbs, trees or rocks that can easily be removed from the trail by hand. Crews should practice caution when throwing rocks and other debris from the trail so as not to hit other hikers, and not to clog drainage structures.


**Clearing rock and debris from trails**


**Logging Out**

**Logging Out**

Logging out refers to the removal of downed trees and downed Saguaros that are in the trail corridor. This can also refer to leaner trees that are obstructing safe passage of stock and riders on the trail. **Crews WILL NOT cut any portion of a standing Saguaro that is obstructing the trail, this should be reported to the Trail Supervisor for further review.**

-Saguaros

Saguaros that are downed on the trail should be removed from the trail corridor. This is easiest done with a Pulaski and a McLeod or similar tools to cut and move the Saguaro. Typically the Saguaro is cut into moveable sections with the Pulaski and moved out of trail view with a McLeod. If the Saguaro is downed and broken into sections do not make additional cuts if you can remove the broken sections by hand. In the lower elevations of Saguaro National Park it is easy to create a social trail as you drag or carry vegetation to stash it off trail. Take care in hiding your tracks if you leave the trail.

-Downed Trees

Downed trees should be cut into rounds and rolled off the downhill side of the trail, be cautious not to block drainage. Whenever possible there should be no evidence of the cuts left behind. This can be accomplished by full removal of the downed tree, and hiding the cut ends by rubbing with soil to diminish the contrast of the cut. Any sections of the tree that are on the uphill side of the trail need to be checked to make sure that they will not slide or roll into the trail corridor, if these sections are moveable, roll them to the downhill side of the trail.

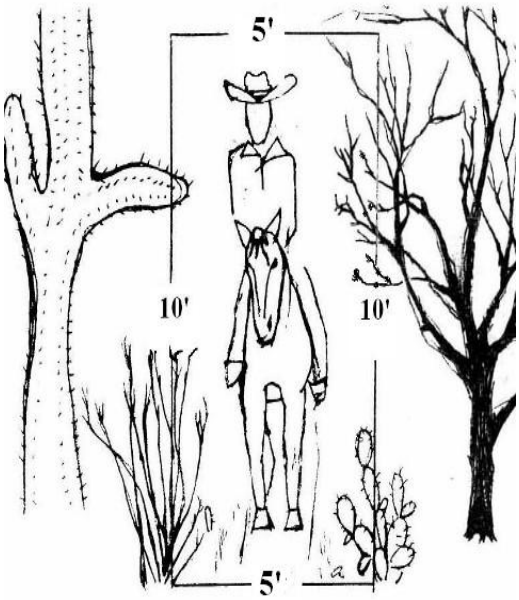
-Leaning Trees

Leaner trees are trees that are leaning into the trail corridor that are causing **immediate danger** to hikers, stock and riders. These could be from wind damage, lightning strikes, or other natural factors. The threat could come from the possibility of the tree falling on the user, or pushing stock from the trail. An assessment of the tree should come from an experienced trail crew worker. The tree should be left if there is not a present or very near future risk of injury from the tree coming down. If the tree is removed crew safety should come first. The tree should be brought to the ground and then treated the same as a downed tree. The stump should be dug around, cut flush to the ground, and hidden as much as possible with dirt and debris.

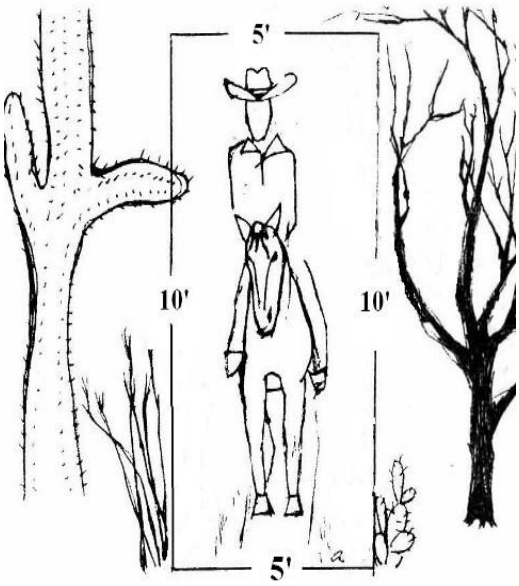
Brushing & Limb Removal

Brushing and pruning refers to the removal of limbs, bushes, and cactus, from the trail corridor. For equestrian use the trail corridor is up to five feet from the center line of the trail, and 10 feet high. For hiker use the trail corridor can be maintained at 8 feet high and width can change dependent on trail design and types of vegetation, with the rule of thumb being to leave plants to support soil stabilization and keep visitors on the trail tread. Knowledge of desert plants and cactus is a must prior to removing limbs and cactus. The goal of trail brushing is the safe and unhindered passage of hikers and equestrians. Overhead limb cutting should permit a person on horseback to ride over the trail without interference from limbs and brush. When you are brushing and limbing, ask yourself the critical question, "Is this limb, cactus or bush in the way of trail users

now, or will it be two years from now.” If it is, cut it now while you have the opportunity. Another "good rule of thumb" while in the field, is to walk down the trail with your arms straight out from your sides. If you can touch any brush, limbs, or cactus (ouch!!) while walking down the center of the trail it needs to come out, but don't forget about those limbs above your head.



Before Brushing



After Brushing

When removing limbs from a tree, cut the limbs off flush with the tree trunk whenever possible. This promotes the good health of the tree. Unsightly cut-off branches or staubs may be the route for disease to enter the tree. Take the extra

time and effort to get your loppers or pole saw close to the tree before cutting. When cutting with a saw, make a shallow undercut first, then follow with the top cut. This allows for a clean cut and prevents the limb from peeling bark off the tree as it falls. If the limb is too high or too large to cut near the tree trunk, try to cut it at a "fork" of the branch as close as possible to the trunk. Treat cactus pads on Prickly-Pear, or "links" on arms of cholla, as tree limbs, and cut them off at forks or junctions. When cutting brush such as, Jojoba, Creosote, and other varieties without a trunk, cut the intruding branch off flush at ground level. This practice will make your work last longer, as well as look better. Keep in mind, that most of the time, only part of the branch in question, may be protruding into the trail corridor, but you must follow that branch back to the ground, trunk, or main fork before you can cut it. (Don't make the mistake many people do, and cut only the part of the branch protruding into the trail corridor). Limbs, cactus, and brush, should be stashed out of sight of the hiker or rider on the trail. Cut ends should face away from the trail. Leaving the area as natural as possible is the goal. Cactus cuttings of any kind, especially Prickly Pear and Cholla, can be considered for transplant in areas with social trails or trail widening issues. (Often cactus will begin to grow, helping to define the trail and stabilize the soil).

## Trail Structures

### 1. Checks/ Retainer Bars

These are structures laid across the trail to fill in rutted sections of trail and hold back tread or fill material. Retainer bars can be constructed out of log or stone with stone being the preferred material due to the prolonged life it has over log. When using stone, the footing you dig, the weight of the rock, and the contact with the other rocks will hold the structure in place. With log, to hold the structure in place one needs to dig a footing, placing the log ½ to 2/3 of its diameter in the ground, securing the ends of the log into the trailside, and then use large rocks buried to hold the check in place. With either material you need to keep any exposed surfaces that are within the trail tread as flat and smooth as possible, not creating additional tripping hazards, and the faces should not be overhanging. When multiple retainer bars are to be installed it is useful to run stringline over the area to determine the proper height for each structure. Checks do not always need to gain elevation, only retain the existing elevation. All check sections need to be protected from water by establishing drainage patterns.

### 2. Waterbars

Waterbars are structures that direct water from the trail. Waterbars should be placed across the trail tread at a fifteen to forty degree angle depending on the grade of the trail. Too steep of an angle could cause erosion and not enough angle could cause the waterbar to clog often with debris and require excessive maintenance. The key in placing waterbars is to look at the natural drainage of

the trail and the area surrounding the trail. You want to place a waterbar to support the natural drainage, and utilizing the most direct route to remove the water from the trail. As with retainer bars the footing is dug and the log or rocks are placed with the majority of the structure buried once you are complete. Waterbars should be low profile so the users hardly notice them. Make sure that the structure is long enough to remove water completely from the trail. It should have a good hiking surface on the top and water should not compromise the structure if it were to make contact with the bar.

3. Retaining Walls

Retaining walls (single or multi-tier) can be constructed of stone or log (cribbing) and are constructed to retain soil in a variety of situations. Retaining walls follow the same guidelines as other structures in that they require a solid footing, high outside contact between materials is desired, and chink and shim rocks placed to tighten the overall structure. With stone multi-tier wall the selection of stones and where they are placed will require more skill than single tier walls, all joints need to be broken as you move up, and the use of header rocks to add strength by securing the wall into the area you are retaining. With log walls (cribbing) notches are cut and spikes or rebar is used to secure the logs together. Tie logs are equivalent to headers, by notching them into the wall logs and running them into the area you are retaining you add strength to the structure.

## Reroutes & New Trail Construction

As crews perform maintenance runs and trail assessments some items below can alert you to areas that could possibly benefit from trail reroutes. These areas should be marked with GPS and reported on your trail assessment sheet that is turned into your supervisor.

**When Should We Consider Reroutes**

- **Trail is damaging cultural resources**
- **Trail Is damaging natural resources**
- **Visitor experience is poor due to improper trail design causing user conflicts, users by-passing trail segments to avoid poor trail conditions, or safety hazards to users.**
- **The route is deemed to be unsustainable. Acceptable maintenance practices for specific sections of trail are not feasible to mitigate problems.**

**What is a Sustainable Trail?**

Sustainability of backcountry trail corridors is defined as the ability of the travel surface to support current and anticipated appropriate uses with minimal impact to the adjoining natural systems and cultural resources. Sustainable trails have

negligible soil loss or movement and allow the naturally occurring plant systems to inhabit the area while allowing for the occasional pruning and removal of plants necessary to build and maintain the trail. If well-designed, built, and maintained, a sustainable trail minimizes braiding, seasonal muddiness and erosion. It should not normally affect natural fauna adversely nor require re-routing and major maintenance over long periods of time.
-National Park Service
Natural Resource Management Reference Manual #77, 2006

**New trail construction including reroutes requires an enormous amount of planning and compliance that will not be contained within this handbook. The information here on reroutes is more of a guide for the field worker or leader about some of the basic principles to be followed once design and work have been approved.**

## 1. Construction Planning

Each reroute will have basic construction plans designed by a supervisor or leader. Simple drawings and/or photos are needed to record the reroute. The plans should also include technical aspects that are needed such as switchback construction or possible structures needed. Rehabilitation should also be identified in this plan.

## 2. Flagging

It is recommended for crew supervisors and leaders to utilize pin flags to layout exact location of the trail route prior to beginning construction. Crew members are then able to “connect the dots” with the flags rather than following flags hanging from tree to tree.

*Crews constructing trail; note the flag line that was followed*

## 3. Corridor Dimensions & Clearing

Corridor width will be determined by the type of use of the trail. It is the same as for maintenance at 8 ft. for hiker only and 10ft. for equestrian trails.

All plants that are removed should be considered for transplant. These should be identified prior to crews digging tread. Anything that is not able to be transplanted should be cut of below grade, and stumps removed if applicable. Any trees that are identified for removal will be marked as such; no other vegetation except what is in the reroute plan will be removed without prior approval from the trails supervisor. As with maintenance all cuttings should be placed out of site from the trail users.

4. Tread Width

Trail width should be based on the use of the trail. For most of the trails here at Saguaro National Park we will be constructing tread 24 to 36 inches wide. This could vary slightly due to natural features, location, and use of the trail.

5. Tread surface

Full bench trail should always be constructed, dig down to mineral soil to create a hard and stable surface. Always keep natural drainage in mind. Once the initial tread is dug your backslope will need to be shaped, it should blend into the hillslope above the trail. Once the backslope is shaped the final trail can be shaped and outsloped to the proper grade.


*Rehabbed trail after 6 months; crew used fill material planting and vertical mulching on old trail*

## Trail Rehabilitation

Trail rehabilitation can occur on existing trails in the form of trail narrowing and the redefining trail junctions throughout the desert environment. Rehabilitation aides in the revival of the natural drainage process, and involves filling in and/or fortifying eroded sections of trail.

## Trail Restoration

Restoration of trails occurs on abandoned or rerouted sections of trail that will no longer be used. All abandoned trails are required to be filled in for restoration to occur. The abandoned trail may need retainer bars and other structures to aid in establishing the drainage and hold fill material in place. Once the old tread is filled, planting and scattering of natural material can take place. The placing of natural and physical barriers is also needed to disguise the old trail and discourage use. This can take place with plants, rocks, and vertical mulching.


*Braided trails before rehab and after.*

Natural recovery in desert environments can take many decades. During the last ten years, staff at Saguaro National Park have been testing a variety of techniques to hasten the land's natural recovery process. Several of these techniques have been quite successful and the park has developed strategies that enable revegetation of a site to natural appearances within just a few years.

## Standard Revegetation Techniques

Plant salvage is used to remove cactus species and some grasses and shrubs prior to a new disturbance. These plants can be immediately transplanted to a new site or they can be maintained in a holding area until the disturbed site is ready to be restored. Saguaros up to 6 feet tall can be moved by park staff, but larger ones require a professional contractor. Saguaros with arms are usually too large to transplant successfully.

When an area is cleared for construction, the top 4-6 inches of soil is removed and stored separately from mineral soils. This topsoil, which is rich in seeds of native plants, is spread across the site following construction and final grading.

Compacted soils may be ripped to a depth of 18 inches where possible. This aerates the soil and increases the likelihood of seed germination. Two passes with the ripper ensure that there are no obvious “furrows” after ripping.

Seed from many types of plants has been hand collected from all areas of the park and labeled according to the zone in which it was collected. These seeds are cleaned, tested, and stored under refrigeration. The seed can be broadcast over a disturbed site and raked in to enhance natural germination.

Native seed from the park can also be provided to a contract nursery that will propagate container-grown plants for later use in revegetation. Tall pots encourage deep rooting, which improves plant survival in desert conditions.

When planting nursery-grown seedlings or transplants, microsites are created by digging shallow depressions to catch water, using cleared plant material to create shade, and placing cages around the plants for protection from herbivores. Plants may be watered during periods of extreme drought during their first two years.

Dead plant material is used as traditional mulch and “vertical” mulch when an area is restored. Vertical mulch consists of tree trunks, branches, ocotillos, saguaro skeletons, chollas, and prickly pear cactus that are “planted” in the ground even though they may not be alive. This creates shade, a wind break, and a visual barrier which helps deter people from walking through the restored area.

## Treatment Plan

There are four types of areas that will need to be rehabilitated or restored. These are trail intersections, abandoned trails, social trails, and old roads. The following discussion describes the techniques that will be used for each of these four situations.

## Trail Intersections

Treatment at these locations will include the posting of Trail Closed signs (e.g., carsonite posts) and obliteration of trails within 100 feet or within visible distance (whichever is shorter) of the intersection. Horizontal and vertical mulch will be placed in the trail tread. If gullies in the trail tread are deeper than 6 inches, water bars or checks will be placed in the gully to slow soil erosion and

encourage new plants to become established. Checks may be made from wattles of weed-free straw, excelsior, or corn husks; native rock from the area; dead branches; or untreated pine lumber. Checks will be 5 to 15 feet apart, depending on the steepness of the slope. Compacted soils may be ripped using hand tools in the most severely impacted areas. Seeds, transplants, and propagated plants will be planted into the area to help restore it to natural condition, with emphasis on planting during the winter cool season when survival rates are highest. The area to be treated using these techniques is estimated to be 8,400 sq. ft. or about 0.2 acres.

## Removed Trails and Social Trails

It is important that soil erosion be slowed on both abandoned and social trails so that natural revegetation will occur as soon as possible. In locations where the trail tread has been eroded to 14 or more inches deep, water bars or checks will be placed to prevent water from removing more soil. The checks will be placed every 5 to 15 feet, depending on the steepness of the terrain, and will be made from material described previously. In general the soil will not be “ripped” or aerated due to the cost and time-consuming nature of such treatments. Seeding with native seeds collected from that plant zone will occur once soils are stabilized and if volunteers are available to assist with such a project. Small scale transplanting of locally available plant material may also occur to speed restoration, if funding and staff are available.

## Closed Roads

The highest priority treatment for closed roads will be in areas where they intersect with newly designated trails. Techniques will be the same as those listed above for Trail Intersections. However, because of the width and soil compaction on some routes that were previously roads, additional ripping of the soil surface and additional vertical mulch will be needed. Broadcast seeding and transplanting locally available plant material will occur if natural regeneration is not sufficient to restore the site in five years.

## Monitoring

The park will monitor the success of restoration efforts. Signs indicating “Trail Closed” will remain at intersections until vegetation has become established and evidence of the old trail has been obliterated; this may take a few years. Abandoned and social trails and old roads should have native plant communities established within five years of abandonment and treatment. If these conditions are not met, additional restoration treatments will be implemented, including some of the more intensive measures described above.

## Backcountry Camps

Throughout the Saguaro backcountry there are 6 backcountry campsites. At various times park crews, volunteers and youth corps will utilize these sites. At other times it might be needed to “spike” crews at undesignated sites that are more convenient for the use of the crew.

Some factors that are looked at to determine a need for a spike camp include; distance of work projects from established camping areas; crew size and availability of established campsites; availability of water; and length of time of the project.

When choosing a spike camp some requirements must be met to establish a temporary camp in a certain location. Listed below are requirements that must be followed for a temporary camp.

- Camps will be a minimum of 200 ft. from any water source
- Vault type toilets will be used; No digging of latrines
- Areas such as helicopter landing zones and slick rock areas will be considered first
- To the extent possible temporary camps should not be visible from the trail
- Temporary camps will not occur within MSO Pacs or Cores from March 1st thru August 1st
- Campfires will be looked at on a case by case basis and approved by the trail supervisor based on need, availability of wood, and ability to rehab the area.
- Food storage will consist of either a bear hang or bear proof containers.
- Camps will consist of a minimum amount of gear that can be easily removed once the crew leaves.
- All garbage will be packed out.

<u>Camp Cleanup</u>

When a crew is breaking down a temporary camp or a designated campsite, crews need to clean the entire area surrounding the camp. This includes the cleaning up of any trash or liter regardless of size, the cleanout of the fire area if there was one, and the restoration of the surrounding area to appear as it did before the camp was set up. Any trails or impacts that were created by the crew need to be rehabbed. All gear should be removed when the crew leaves the camp. If any gear is left behind a list of all items left needs to be given to a trails supervisor. All sites should be inspected by the field trail leader and if possible, approved by the trail supervisor.

## Common Terms

**Armoring**
Reinforcement of an unstable surface with a stable surface such as rock.

**Backslope**
The cut bank on the uphill side of the trail. The slope will vary depending on the hill slope and soil that the trail crosses.

**Batter**
The lean of a retaining wall into the material in which it is retaining.

**Bedrock**
Natural solid rock surfaces.

**Bench Cut**
Trail tread that is excavated on a hill slope. Two main types of bench cut trails are Full Bench and Half Bench. Full Bench Trail is when the complete tread surface is excavated; this is the most long-lasting surface.

**Berm**
Material that builds on the outside edge of a trail. Berm will cause water to become trapped on the trail causing further erosion.

**Braided/Social/Wildcat Trails**
All used to describe unplanned/unauthorized trails developed by users and are neither designated nor maintained.

**Causeway**
A raised section of trail usually constructed of log or stone that crosses wet or eroded areas.

**Check Dam**
Erosion control structure constructed of log or rock that is placed across trails to slow water flow and hold tread material in place.

**Chink Rocks**
Rocks that are hammered in between two placed stones in a structure to tighten the joints. Typically you should not place chink rocks from the front or face of a trail structure.

**Clinometer**
Hand held instrument used to measure grades.

**Crowning**
The method of placing material in the center of the tread area so that water is displaced on either side.

**Deadman**
Large log or rock that is used to anchor a section of trail, or used to direct stock and people to staying on a section of trail.

**Downslope**
Downhill side of a trail.

**Dry Laid Stone Masonry**
Stone construction without the use of wet mortar.

**Erosion Control**
A wide variety of methods used to reduce soil erosion.

**Fall Line**
The natural downhill course of water between two points on a slope.

**Fill**
Rock or soil placed to raise the grade to a desired height. Can be placed in the trail, and behind structures such as walls and checks.

**Footing**
Foundation for a trail structure that can assist in supporting and distributing the load of the structure.

**Grade Reversals**
A short drop in the trail followed by a rise. This will force water off the trail at certain interval not allowing it to run down the tread for longer lengths. Can also be called grade dip, drainage dip, and rolling dips.

**Header Stone**
A stone placed in wall structures with the majority of its weight buried into the area that is retaining, this will add strength to the overall structure.

**High Outside Contact**
Area between two stones contacting at the top outside edges.

**Inside Wall**
Wall laid on the uphill side of a trail.

**Inslope**
When the slope of the trail runs towards the backslope. Can be used in switchback construction

**Joints**
Contact points of two rocks or logs in a structure.

**Junk Wall**
Wall constructed that may not follow all of the rules of dry stone masonry structures. Not all joints are broken and care to achieve high outside contacts is not needed. These are constructed in areas where a more structurally sound wall is not needed or there is not time to build.

**Keystones**
A large stone used to hold others in place.

**Mineral Soil**
Dirt that is below the top layer of organic material. Bench trails should be dug down to mineral soil.

**Outside Wall**
Wall laid on the downhill side of a trail.

**Outslope**
When the outside edge of the trail is lower than the inside. This is done to help in the drainage of water off the trail.

**Shim**
A rock used to fill in spaces of a structure. Used to tighten structures and add strength.

**Slough**
Dirt and debris from the backslope of a trail that deposits onto the tread. This can cause trail creep as it pushes users to the downhill side of the trail.

**Trail Grade**
The amount of vertical change in a trail between two points. If a trail has a 7 ft. rise in 100 ft the grade would be 7%.

**Trail Tread**
The walking surface of a trail, can be natural or other material such as concrete, asphalt, etc.

**Upslope**
Uphill side of a trail.

## REFERENCES

Griswold, Stephen
1996 A Handbook on Trail Building and Maintenance

IMBA (International Mountain Biking Association)
2004 Trail Solutions, IMBA's Guide to Building Sweet Single Track

USDA
2004 Trail Construction and Maintenance Notebook, 2004 Edition

National Park Service
Guide to Sustainable Mountain Trails, Trail Assessment, Planning & Design Sketchbook 2007 Edition

Natural Resource Management Reference Manual #77 2006

## Rincon Mountain District Trail Mileage

| | TRAIL NAME | LENGTH MILES | WILDERNESS MILES | <4,000 FT MILES | TRAIL TYPE |
|---|---|---|---|---|---|
| 1 | Bajada Vista | 1.5 | 1.5 | 1.5 | B |
| 2 | Bonita | 0.8 | 0.8 | 0 | C |
| 3 | Bridal Wreath Falls | 0.3 | 0.3 | 0.3 | B |
| 4 | Cactus Forest | 5 | 0.5 | 5 | B |
| 5 | Carrillo | 3.5 | 3.5 | 3.5 | B |
| 6 | Cholla | 0.7 | 0 | 0.7 | B |
| 7 | Cow Head Saddle | 3.3 | 3.3 | 0 | C |
| 8 | Creosote | 0.4 | 0.4 | 0.4 | B |
| 9 | Deer Head Spring | 0.8 | 0.8 | 0 | C |
| 10 | Deer Valley | 0.4 | 0.4 | 0.4 | B |
| 11 | Desert Ecology | 0.2 | 0 | 0.2 | A |
| 12 | Devil's Bathtub | 1.2 | 1.2 | 0 | C |
| 13 | Douglas Springs | 9.8 | 9.7 | 3 | B |
| 14 | East Slope | 0.8 | 0.8 | 0 | C |
| 15 | Fire Loop | 6.3 | 6.3 | 0 | C |
| 16 | Freeman Homestead | 1 | 0.9 | 1 | B |
| 17 | Freight Wagon | 1.3 | 1.3 | 1.3 | B |
| 18 | Garwood | 1.4 | 1.4 | 1.4 | B |
| 19 | Heartbreak Ridge | 3.5 | 3.5 | 0 | C |
| 20 | Hope Camp | 2.8 | 0 | 2.8 | B |
| 21 | Italian Springs | 6.4 | 6.4 | 0 | C |
| 22 | Kennedy | 1 | 1 | 1 | B |
| 23 | Loma Verde | 2.1 | 1.7 | 2.1 | B |
| 24 | Manning Camp | 9.6 | 9.6 | 0 | C |
| 25 | Mesquite | 1 | 0 | 1 | B |
| 26 | Mica Mountain | 1.4 | 1.4 | 0 | C |
| 27 | Mica View | 1 | 0 | 1 | B |
| 28 | Miller Creek | 4.4 | 4.4 | 0 | C |
| 29 | North Hope Camp | 0.3 | 0 | 0.3 | C |
| 30 | North Slope | 3 | 3 | 0 | C |
| 31 | Palo Verde | 0.2 | 0.2 | 0.2 | B |
| 32 | Pink Hill | 1.4 | 0.7 | 1.4 | B |
| 33 | Ridgeview | 0.8 | 0 | 0.8 | C |
| 34 | Rincon Creek | 11.8 | 10.8 | 0 | C |
| 35 | Saguaro | 0.9 | 0.9 | 0.9 | B |
| 36 | Shantz | 4.6 | 0.4 | 4.6 | B |
| 37 | Spur | 0.1 | 0.1 | 0.1 | B |
| 38 | Squeeze Pen | 2 | 2 | 2 | B |
| 39 | Stock By-Pass | 0.5 | 0.5 | 0.5 | B |
| 40 | Tanque Verde Ridge | 11.5 | 11.4 | 2 | C |
| 41 | Three Tank | 2.1 | 2.1 | 2.1 | B |
| 42 | Turkey Creek | 6.2 | 6.2 | 0 | C |
| 43 | Wentworth | 2.9 | 2.1 | 2.9 | B |
| 44 | Wild Horse | 1.6 | 1.6 | 1.6 | B |
| 45 | Rincon Peak | 3.2 | 3.2 | 0 | C |
| 46 | Mica Meadow | 0.6 | 0.6 | 0 | C |
| | **TOTAL** | **125.6** | **106.9** | **46** | |

## Tucson Mountain District Trail Mileage

| | TRAIL NAME | LENGTH MILES | WILDERNESS MILES | <4,000 FT MILES | TRAIL TYPE |
|---|---|---|---|---|---|
| 1 | Bajada Wash | 1.7 | 0 | 1.7 | B |
| 2 | Brittle Bush | 1 | 0.6 | 1 | B |
| 3 | Cactus Canyon | 0.7 | 0 | 0.7 | B |
| 4 | Cactus Wren & Signal Hill | 2 | 1 | 2 | B |
| 5 | Cam-Boh | 2.9 | 1 | 2.9 | B |
| 6 | Coyote Pass | 0.8 | 0 | 0.8 | B |
| 7 | Desert Discovery | 0.3 | 0 | 0.3 | A |
| 8 | Dobe Wash | 1.4 | 1 | 1.4 | B |
| 9 | Encinas | 3.3 | 3 | 3.3 | B |
| 10 | Gila Monster | 0.6 | 0 | 0.6 | B |
| 11 | Gould Mine | 1.1 | 1.1 | 1.1 | B |
| 12 | Hugh Norris | 4.6 | 4.5 | 4 | B |
| 13 | Ironwood Forest | 1.4 | 1.4 | 1.4 | B |
| 14 | King Canyon | 2.3 | 1.9 | 2.3 | B |
| 15 | Manville | 2.2 | 1.7 | 2.2 | B |
| 16 | Mule Deer | 0.3 | 0.1 | 0.3 | B |
| 17 | Panther Peak Wash | 1.9 | 1.7 | 1.9 | B |
| 18 | Picture Rocks Wash | 2.2 | 1.2 | 2.2 | B |
| 19 | Prophecy Wash | 1.9 | 1.7 | 1.9 | B |
| 20 | Ringtail | 0.9 | 0 | 0.9 | B |
| 21 | Roadrunner | 1.4 | 1.3 | 1.4 | B |
| 22 | Sendero Esperanza | 3.1 | 3 | 3.1 | B |
| 23 | Sweetwater | 4.3 | 2 | 3.9 | B |
| 24 | Thunderbird | 0.7 | 0 | 0.7 | B |
| 25 | Tortise & Surronding | 7 | 0 | 7 | B |
| 26 | Valley View Overlook | 0.5 | 0 | 0.5 | B |
| 27 | Wasson Peak | 0.3 | 0.3 | 0 | B |
| 28 | Wild Dog | 1 | 0 | 1 | B |
| | **TOTAL** | **51.8** | **28.5** | **50.5** | |

# APPENDIX F: RELATED LAWS, REGULATING POLICIES AND PLANS

In addition to NPS-specific mandates and policies described above, the NPS is governed by other laws and regulations. Based on the scope of this plan, these include the following.

## National Environmental Policy Act of 1969, as Amended

Section 102(2)(c) of the NEPA requires that an environmental impact statement (EIS) be prepared for major federal actions that may significantly affect the quality of the human environment. The primary purpose of an EA is to determine whether or not a proposed action could have significant impacts requiring an EIS. An EA may also be prepared "at any time in order to assist agency planning and decision making." This can apply when conflicts exist about alternative uses of natural resources.

NEPA requires federal agencies to consider alternatives and to analyze the impacts of those alternatives. The act is implemented through regulations of the Council on Environmental Quality (CEQ) (40 CFR 1500–1508). The NPS has in turn adopted procedures to comply with the act and the CEQ regulations, as found in *Director's Order 12, Conservation Planning, Environmental Impact Analysis, and Decision making* (NPS 2001), and its accompanying handbook.

## The *Omnibus Management Act* (16 USC 5901 et seq.)

Underscores the NEPA provisions in that both are fundamental to park management decisions. Both acts provide direction for connecting resource management decisions to the analysis of impacts and communicating the impacts of those decisions to the public using appropriate technical and scientific information. Both acts also recognize that such data may not be readily available, and they provide options for resource impact analysis should this be the case. Section 4.5 of *Director's Order 12* adds to this guidance by stating, "when it is not possible to modify alternatives to eliminate an activity with unknown or uncertain potential impacts, and such information is essential to making a well-reasoned decision, the National Park Service will follow the provisions of the CEQ regulations (40 CFR 1502.22)." In summary, the NPS must state in an environmental assessment (EA) or environmental impact statement (1) whether such information is incomplete or unavailable; (2) the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment; (3) a summary of existing credible scientific adverse impacts that is relevant to evaluating the reasonably foreseeable significant adverse impacts; and (4) an evaluation of such impacts based on theoretical approaches or research methods generally accepted in the scientific community.

Collectively, these guiding regulations provide a framework and process for evaluating the impacts of the alternatives considered in this EA.

### Endangered Species Act of 1973, as Amended

The purpose of the *Endangered Species Act* (ESA) is to conserve "the ecosystems upon which endangered and threatened species depend" and to conserve and recover listed species. Under the law, species may be listed as either "endangered" or "threatened." Endangered means a species is in danger of extinction; threatened means a species is likely to become endangered. All species of plants and animals, except pest insects, are eligible for listing. All federal agencies are required to protect listed species and preserve their habitats. The law also requires federal agencies to consult with the USFWS to ensure that the actions they take, including actions chosen under this deer management plan, will not jeopardize listed species.

### The National Historic Preservation Act of 1966, as Amended

Section 106 of the *National Historic Preservation Act* requires that federal agencies consider the effects of their undertakings on properties listed on or potentially eligible for listing on the National Register of Historic Places. All actions affecting the park's cultural resources must comply with this legislation.

### Wilderness Act of 1964

Congress enacted the *Wilderness Act* (Public Law [PL] 88-577) in 1964 to establish a National Wilderness Preservation System of federal lands "where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." The NPS is one of four federal agencies responsible for protecting and preserving wilderness. Wilderness areas in national parks are to be given supplemental and permanent protection beyond that normally afforded other backcountry resources. The *Wilderness Act* provides a degree of protection to the resources of the NPS that the NPS *Organic Act* does not. Although the *Organic Act* and the *Wilderness Act* speak in comparable terms about preserving the integrity of resources, the *Wilderness Act* prohibits activities in national park wilderness areas that the *Organic Act* permits or leaves open to interpretation. The effect of the *Wilderness Act* is to unambiguously place an additional layer of protection on wilderness areas within the NPS (NPS 1999). The *Wilderness Act* defines wilderness as described below:

> A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who

> does not remain. An area of wilderness is further defined to mean in this Act 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 and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

Regarding use of wilderness areas, the act states:

> Except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character. Except as otherwise provided in this Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use.

The act prohibits roads (permanent or temporary) in wilderness areas. Use of motor vehicles, motorized equipment, or other forms of mechanical transport is prohibited. No structure or installation can be erected within wilderness areas.

## Code of Federal Regulations, Title 36

Title 36 of the Code of Federal Regulations provides the regulations “for the proper use, management, government, and protection of persons, property, and natural and cultural resources within areas under the jurisdiction of the NPS” (36 CFR 1.1(a)).