

*DRAFT*  
GENERAL MANAGEMENT PLAN  
DEVELOPMENT CONCEPT PLANS  
ENVIRONMENTAL IMPACT STATEMENT



ORGAN PIPE CACTUS  
NATIONAL MONUMENT  
ARIZONA

ON MICROFILM

SCANNED

4/17/01

PLEASE RETURN TO:  
TECHNICAL INFORMATION CENTER  
DENVER SERVICE CENTER  
NATIONAL PARK SERVICE

PURPOSE AND NEED  
FOR THE PLAN



**Draft  
General Management Plan  
Development Concept Plans  
Environmental Impact Statement**

---

**ORGAN PIPE CACTUS  
NATIONAL MONUMENT  
PIMA COUNTY, ARIZONA**

This Draft General Management Plan/Development Concept Plan/Environmental Impact Statement presents two alternatives for the management, use, and preservation of Organ Pipe Cactus National Monument. *Alternative 1, The Preferred Future* constitutes the National Park Services' proposed management plan for the park as it recognizes the full range of scientific, wilderness, and recreational values of the Sonoran Desert ecosystem. The proposal calls for upgrading existing programs and facilities to manage, preserve, protect, research, and interpret the park's exceptional resources. Major features of the plan include increased regional, tri-national, and inter-agency cooperative efforts, preservation treatments for several significant cultural resources, new facilities and other improvements in the Twin Peaks, Lukeville, and Quitobaquito Springs areas, and redesignation of the monument to Sonoran Desert National Park. In addition, the National Park Service proposes to facilitate a cooperative planning effort to find solutions to reduce the impacts to natural resources and visitor safety from the increasing and diverse volumes of traffic travelling at excessive speed along State Route 85. Unless significant changes can be made, excessive mortality along State Route 85 would continue to eliminate wildlife along this corridor. The major consequence of implementing this proposal would be to enhance protection, understanding, and recognition of the Sonoran Desert and further strengthen relations with local communities, the Tohono O'odham Nation and Mexico. Implementing the proposed actions could also lead to an expansion of the National Wilderness Preservation System by 2,130 acres and help perpetuate the existence of endangered and sensitive species, including the Quitobaquito desert pupfish and Quitobaquito snail.

The other alternative considered constitutes the National Park Service's *no action* alternative. *Alternative 2, A Continuation of Existing Conditions*, is based primarily on continuing the course of action as described in approved documents that have been guiding park management and development. Many actions are similar to Alternative 1, except that fewer developments and programs are proposed. In general, the consequence of this proposal is also similar, but would occur to a lesser degree. There are two major exceptions. The persistent degradation of the only known habitat for the desert pupfish and the Quitobaquito snail could potentially jeopardize their continued existence. Secondly, NAFTA-related improvements to State Route 85 that are identified by the State of Arizona, could increase traffic levels and speed along this road and could eliminate the Mexican rosy boa (listed under the Endangered Species Act) and other wildlife in this area. The park would work with the State to reduce possible impacts from these improvements, however, there is not expected to be any significant reduction in the volume or speed of traffic.

The review period for this document ends on July 10, 1995. All comments must be received by that time and should be addressed to:

Superintendent, Organ Pipe Cactus National Monument  
Route 1, Box 100  
Ajo, Arizona, 85321

---

United States Department of the Interior  
National Park Service, Denver Service Center

# CONTENTS

Summary	v
Summary of Comparison of Alternatives	v
Summary of Comparison of Consequences	xii

Resumen	xv
Resumen de Comparacion de Alternativas	xv
Resumen Comparativo de Consecuencias	xxiii

## PURPOSE AND NEED FOR THE PLAN

Background	3
Purpose and Need for the Plan	3

Direction For The Plan	9
Purpose Statements	9
Significance of Organ Pipe Cactus National Monument	9
Planning Issues and Concerns	10
Desired Futures	12

## THE PROPOSAL AND ALTERNATIVES

Introduction	17
Alternatives Considered but Rejected	17
Organization of this Document	18
Alternative 1: The Preferred Future	19
Land Use and Management	19
Redesignation	19
Management Zones	19
Resource Management	23
Natural and Cultural Resources Management Plan	23
Science and Resources Management Center	23
Cultural Resource Preservation	24
Native American Consultations	24
Visual Resource Preservation	26
Visitor Use and Associated Facilities	27
Interpretation	27
Camping	30
Area Transportation Network	31
Park Operations and Associated Facilities	32
Staffing	32
Facilities	33
Employee Housing	35
Cooperative Management and Planning in the Region	34

Development Concept Plans	35
Twin Peaks	35
Quitobaquito Springs	36
Lukeville DCP Revision	36
Name, Boundary, and Wilderness Area Changes	37
Redesignation	37
Boundary Adjustments	38
Wilderness Additions	38
Plan Implementation and Costs	45
Implementation	45
Cost Estimates	45

Alternative 2: A Continuation of Existing Conditions	47
Land Use and Management	47
Management Zones	47
Resource Management	47
Natural and Cultural Resources Management Plan	48
Comprehensive Management Program	48
Natural Resource Management	48
Cultural Resource Preservation	51
Native American Consultations	51
Visual Resource Preservation	51
Visitor Use and Associated Facilities	51
Interpretation	51
Area Transportation Network	52
Park Operations and Associated Facilities	52
Staffing	52
Facilities	52
Employee Housing	53
Cooperative Management and Planning in the Region	53
Development Concept Plans	53
Twin Peaks	53
Quitobaquito Springs	53
Lukeville	53
Name, Boundary, and Wilderness Area Changes	54
Wilderness Additions	54
Plan Implementation and Costs	58
Implementation	58
Cost Estimates	58

## THE AFFECTED ENVIRONMENT

The Natural Environment	63
Special Designations	63
Biosphere Reserve	63

Organ Pipe Cactus Wilderness	63
Physiography and Geology	64
Physiography	64
Geology	64
Soils	67
Soil Characteristics	67
Soil Erosion	67
Air Resources	68
Water Resources	68
Floodplains	69
Wetlands	70
Wildlife	70
Mammals	70
Birds	71
Herpetofauna	72
Fish	73
Invertebrates	73
Threatened, Endangered, and Sensitive Wildlife	73
Wildlife Species of Special Concern	76
Vegetation	76
Mixed Sonoran Desertscrub	77
Creosotebush-Bursage	69
Evergreen Woodland/Mesic Evergreen Scrubland	77
Marsh and Open Water	77
Riparian	77
Non-Native Vegetation	78
Threatened and Endangered Plants	78
Plant Species of Special Concern	78
Cultural Environment	80
Overview	80
Prehistory and Archeological Resources	80
Archeological Surveys	83
History and Historic Resources	83
National Register Listed Properties	86
Ethnography and Ethnographic Resources	87
Visitor Use and Experience	90
Visitor Profile	90
The Visitor Experience	91
Park Operations	93
Staffing and Operational Costs	93
Facilities	93
Roads	93
Trails	93
Camping Areas	93
Light Pollution	94
Powerlines	95
Twin Peaks Area	95
Quitobaquito Springs	95
Lukeville	96

Regional Environment	97
Surrounding Land Uses	97
Socioeconomy	97
Pima County	97
Maricopa County	99
Yuma County	100
Tohono O'odham Reservation	100
Mexico	100
Transportation	101
North American Free Trade Agreement	101

## ENVIRONMENTAL CONSEQUENCES

Introduction	105
Impact Topics	105
Environmental Consequences	107
Impacts on Wilderness	107
Impacts on Air Quality	108
Impacts on Floodplains, Wetlands, and Water Resources	110
Impacts on Threatened, Endangered, and Sensitive Species	111
Impacts on Vegetation and Soil	113
Impacts on Wildlife	115
Impacts on Cultural Resources	117
Impacts on Visitor Use and Experience	120
Impacts on Socioeconomics	122
Cumulative Impacts	123
Consultation and Coordination	127
Scoping Process	127
Native American Consultation	127
Consultation with the Arizona State Historic Preservation Officer	128
List of Reviewers	128
Planning Team and Contributors	130

## APPENDIXES AND BIBLIOGRAPHY

A: Legislation	133
B: Cost Estimate Breakdowns	145
C: Threatened and Endangered Plant Species	148
D: Threatened, Endangered, Candidate, and Rare Wildlife Species	150
E: Cultural Compliance Requirements	152
F: Projected Visitation	153
G: Consultations with the U.S. Fish and Wildlife Service and the Arizona Fish and Game Department	154
Abbreviations	157
Bibliography	158

## LIST OF MAPS AND ILLUSTRATIONS

The Sonoran Desert Region	5
Organ Pipe Cactus National Monument and the Region	7
Alternative 1: The Preferred Future	21
Alternative 1: Twin Peaks Development Concept Plan	39
Alternative 1: Quitobaquito Management Area Development Concept Plan	41
Lukeville: Land Ownership and Development	43
Alternative 2: A Continuation of Existing Conditions	49
Alternative 2: Twin Peaks Development Concept Plan	55
Alternative 2: Quitobaquito Management Area Development Concept Plan	57
Areas and Features of Organ Pipe Cactus National Monument	65

## LIST OF TABLES

1: Cultural Resource Treatments for Significant Properties	22
2: Threatened and Endangered Plant Species	148
3: Rare and Sensitive Plant Species	149
4: Threatened, Endangered, and Candidate Wildlife Species	150
5: Visitation by Month (1989-1993)	90
6: Age Ranges of Visitors	91
7: Activities of Visitors	91
8: Existing Full Time Equivalent Positions	93
9: Shielding Requirements	94
10: Employment Trends of Pima County	98
11: Projected Visitation	153

## SUMMARY

Organ Pipe Cactus National Monument was established by Presidential Proclamation in 1937 to preserve approximately 330,689 acres of Sonoran Desert for the public interest. It is managed by the National Park Service (NPS), and located in southwestern Arizona on the international border with Mexico. It contains a wide variety of ecologically and culturally significant resources including the endangered Quitobaquito desert pupfish and sites of archeological and ethnographic importance. Some of these sites are still in use by the ancestors of the original Tohono O'odham people whose 2.8 million acre reservation borders the monument on the east. Visitors, scientists, and researchers come to view the unique resources, and to enjoy the quiet and solitude found in the Organ Pipe Cactus Wilderness. In 1976, it was designated a Biosphere Reserve as a part of the UNESCO Man and the Biosphere program. With the steady growth in the number of people coming to this area, the existing facilities have not been able to accommodate demand. The resources, especially at Quitobaquito Springs and along State Route 85, also suffer from this crowding.

Two alternative "futures" for the park were developed to address the need for change, and explore ways to preserve the Sonoran Desert resources. Many alternatives were considered during this planning effort which began in 1988. However, once the park's purpose and significance were defined by the NPS, and the Wilderness Act carefully reviewed, the range of appropriate management options narrowed considerably. *Alternative 1: the Preferred Future*, constitutes the NPS's proposed course of action. This alternative also represents the actions and developments needed to make the park operational in a way that best provides for primary visitor use, area management, and resource protection. *Alternative 2: A Continuation of Existing Conditions* constitutes the NPS's no action alternative and is based primarily on continuing the course of management as described in current approved documents.

The summary of the alternatives and consequences discussed in this document are contained on the following pages. They have been presented in a table format to assist the reader in comparing the alternatives and consequences of implementing each alternative. For more complete information on a given topic, the reader should consult the corresponding section of the document.

### SUMMARY of COMPARISON of ALTERNATIVES

Topics	Alternative 1: The Preferred Future	Alternative 2: A Continuation of Existing Conditions
<b>LAND USE AND MANAGEMENT</b>		
<b>Management Zones</b>	Modifies existing zones based on legislation, park purpose and significance, and visitor experience. The proposed zones and subzones include:  Wilderness Zone Potential Wilderness Quitobaquito Management Area Non-Wilderness Zone: Travel Corridor Development Area Cultural Zone	The existing management zone system would remain. The zones and subzones include:  Natural Zone: Wilderness Subzone Natural Environment Subzone Historic Zone Development Zone Special Use Zone: Private Development Subzone State Lands Subzone U.S. Customs and Immigration Reserve Subzone

Topics	Alternative 1: The Preferred Future	Alternative 2: A Continuation of Existing Conditions
<b>RESOURCE MANAGEMENT</b>		
<b>Natural and Cultural Resources Management Plan (1994)</b>	The NCRMP would continue guiding management of the park's natural and cultural resources. This alternative proposes additional actions not currently identified in the NCRMP.	As in Alternative 1, the NCRMP would guide the resources management program. Certain actions proposed in the plan help to resolve issues identified during scoping for this general management plan including: establishing a comprehensive, integrated Resources Management program, expanding of the Ecological Monitoring program, and increasing efforts to preserve air and water resources.
<b>Science and Resources Management Center</b>	A new 12,000 s.f. Science and Resources Management Center, a 1,600 s.f. greenhouse, and a 3,600 s.f. plant nursery would be constructed and would serve to: concentrate natural and cultural resource management functions at one location; provide a forum and work space for the science and research community; and provide park visitors with an understanding of the Sonoran Desert ecosystem and the park's activities to preserve it. The Center would contain offices, a conference room, labs, museum storage, archival space, a library, and work rooms. The houses that now serve as the resource centers, would be converted back to employee residences.	The single family residences that currently function as the resource centers would remain. Other structures may be added as the park's staffing levels continue to increase.
<b>Cultural Resources</b>	<p>Preservation and use treatments are proposed for the following culturally-significant properties: Bates Well Ranch, Bull Pasture, Dos Lomitas Ranch, Gachado Well and Line Camp, Growler Mine and Mining District, P'itoy Mo'o (Montezuma's Head), Milton Mine, Quitobaquito Springs, Victoria Mine, Historic Water Resources, Wall's Well-Bates Well Road, International Boundary Markers, El Camino del Diablo, and Ranching Line Camps.</p> <p>Cultural resources would continue to be evaluated for possible National Register listing and new developments would be surveyed for archeological resources prior to construction and potential impacts to these resources mitigated.</p>	<p>As for Alternative 1, evaluations of cultural resources for National Register listing would continue. New developments would be surveyed for archeological resources prior to construction and potential impacts to these resources mitigated.</p> <p>Historic properties listed or eligible for listing in the National Register of Historic Places would continue to be stabilized as funds become available.</p>
<b>Native American Consultation</b>	The current effort would be strengthened by establishing a memorandum of understanding to identify and protect important cultural sites in the park. The agreement would cover procedures to determine when the park would share information, consult on finds, and ask for guidance on appropriate treatments and interpretation of significant resources.	Consultation with American Indian groups would continue to grow, as it has over the past few years, on an as needed basis.

Topics	Alternative 1: The Preferred Future	Alternative 2: A Continuation of Existing Conditions
<b>Visual Resource Preservation</b>	Two actions are proposed to help preserve the visual resources of the Sonoran Desert landscape: relocating and placing powerlines underground at their next scheduled replacement and implementing sustainable design guidelines and practices prior to the design of new facilities.	No additional actions would be taken to enhance visual resource preservation.
<b>VISITOR USE AND ASSOCIATED FACILITIES</b>		
<b>Interpretation</b>	<p><b>Objectives and Themes.</b> New objectives and themes were developed in an Interpretive Prospectus (1993) and would guide the park's interpretive program.</p> <p><b>Facilities and Programs.</b> The following new and improved facilities and programs are proposed to achieve the objectives and themes:</p> <ul style="list-style-type: none"> <li>- a new 6000 s.f. visitor center with a lobby, information desk, sales area, exhibits area, outdoor patio, theater, rest rooms, and an outdoor, relatively short, interpreted trail accessible to visitors with disabilities;</li> <li>- a lobby with exhibits and a multi-purpose room in the new Science and Resources Management Center;</li> <li>- rehabilitate the existing campground amphitheater area including increasing the parking area;</li> <li>- new wayside exhibits at pullouts, scenic drives, and several key resource features; and</li> <li>- an expanded program of partnerships and outreach.</li> </ul>	<p><b>Objectives and Themes.</b> As in Alternative 1, the objectives and themes in the IP would be used to guide the interpretive program.</p> <p><b>Facilities and Programs.</b> The park is currently carrying out interim facilities and programs identified in the IP which include:</p> <ul style="list-style-type: none"> <li>- the recently improved theater, slide program, and exhibits at the existing visitor center,</li> <li>- upgrading the campground amphitheater area as in Alternative 1, and</li> <li>- also in Alternative 1, expanding the partnerships and outreach programs in response to the Biosphere Reserve designation.</li> </ul>
<b>Camping</b>	<p>Opportunities for primitive style camping near parking would be increased. In the Twin Peaks Campground, 20 new walk-in campsites, up-canyon from the existing group camping area, would be developed. The existing parking area would be expanded for 20 vehicles and one rest room would be added.</p> <p>In the Alamo Canyon Wash Campground, one camping area containing 4 sites, each with parking, a picnic table, fire ring, and trash facilities, and one composting toilet, would be added. A separate parking area for six vehicles would be designated within the existing loop drive for day use only. A carrying capacity based on visitor experience and resource protection would be determined for this area before any additional campsites are added.</p>	Existing camping facilities at Twin Peaks and Alamo Canyon Wash Campground would remain.

Topics	Alternative 1: The Preferred Future	Alternative 2: A Continuation of Existing Conditions
<b>Area Transportation Network</b>	<p><b>State Route 85.</b> The NPS would seek and facilitate a cooperative planning effort to find solutions to make this roadway more compatible with wilderness values, better protect resources, and improve safety for visitors and residents. This planning effort might include looking for an alternative route and port-of-entry for commercial and other through traffic.</p> <p>In the mean time, the NPS would work with the State and regional transportation agencies to reduce the existing impact of the road on visitors, resources, and wilderness values. Efforts would include: adding informational signs at the entrances, reducing the speed limit to 45 mph, and if the speed is reduced, adding pull-outs and interpretive messages.</p> <p><b>Trails.</b> Eleven new maintained trails, totalling approximately 30 miles, are proposed to provide visitors access to resources and an understanding of the park's interpretive themes. Signs and route descriptions would be improved for the existing unmaintained trails.</p>	<p><b>State Route 85.</b> The park would work closely with the State and other agencies to minimize impacts from proposed improvements due to anticipated traffic increases.</p> <p><b>Trails.</b> Improvements would be made to existing, maintained trails and include making two trails accessible for wheelchairs, posting signs or exhibits at four trails, and lengthening the Visitor Center Nature Trail. As described in Alternative 1, the existing unmaintained, primitive trails would remain.</p>
<b>PARK OPERATIONS AND ASSOCIATED FACILITIES</b>		
<b>Staffing</b>	Approximately 36 FTEs would be required to fully implement this alternative. This number includes the amount needed to satisfy existing conditions. The parks active VIP program would continue to utilize volunteers to help offset expanding staffing and program needs.	Approximately 27.3 FTEs would be required to fully implement this alternative. As in Alternative 1, the park would continue using VIPs This number would be in addition to the amount needed to satisfy existing conditions .
<b>Facilities</b>	New facilities would be constructed and others improved to accommodate existing and future space needs, separate employee and visitor use areas, and provide a more efficient, productive, and safe working environment. The existing 5,900 s.f. visitor center and administrative building would be rehabilitated into a centralized administrative facility; a new 4,600 s.f. ranger operations and fire station would be constructed with a nearby helipad area; and the existing maintenance area would be expanded to include 2,000 s.f. office and work space, 9,100 s.f. covered parking, and 3,050 s.f. storage space.	The existing administrative and maintenance facilities would remain. As described in Alternative 1, a new 3,000 s.f. ranger operations and fire station would be added to meet existing space needs.

Topics	Alternative 1: The Preferred Future	Alternative 2: A Continuation of Existing Conditions
<b>Employee Housing</b>	The existing housing area at Twin Peaks would be infilled adding: four rehabilitated single family residences; ten apartment units in one or two buildings with covered parking for employees and visiting researchers; a utility building with laundry, showers and food storage facilities; a satellite dish; and a new community building with parking spaces, a playground, volleyball court, and barbecue. Additional housing needs would be accommodated through the existing free market in Ajo, Why, and Lukeville.	The existing housing area would remain. As in Alternative 1, additional housing needs would be met in Ajo, Why, and Lukeville.
<b>Cooperative Management</b>	Continue central and cooperative role with ISDA and other interested groups to protect and manage the resources in the Sonoran Desert region. Develop an action plan to increase MAB emphasis including ventures with the adjoining Biosphere Reserves in Mexico. Employ an international affairs / management assistant / community planner to work with ISDA, develop the MAB plan, and coordinate efforts involving other agencies, communities, and nations.	As in Alternative 1, work with ISDA would continue and an action plan to increase the MAB emphasis would be developed.

**DEVELOPMENT CONCEPT PLANS**

<b>Twin Peaks</b>	<p>As described in previous sections, several new developments are proposed to serve expanding needs of visitors, park staff, and the science community. All facilities are located outside of the probable maximum flood zone. The new Visitor Center, Science and Resource Management Center, and rehabilitated Administrative facility would become a central complex and include a picnic area with 6 sheltered tables and a parking area that could accommodate buses and over-size RVs. A parking area for employees would be located on the other side of the complex. The new Ranger Operations and Fire Station would be located a short distance away and would include a ten space parking area. Expansions for the maintenance facility and housing area would occur adjacent to their existing locations in previously disturbed areas.</p> <p>The existing network of roads would be changed to separate visitor from employee use areas. Approximately 1/2 mile of new road would be constructed and 1500 ft. length of existing two-lane road would be removed and the area restored to natural conditions. Visitors and employees would each have separate access and parking areas. A new entrance and turn-around area for Puerto Blanco Drive would be easier for visitors to locate and allow them to turn around if they chose not to take this one-way scenic drive.</p>	<p>The existing joint visitor center and administrative building would be retained. A new modular office building and Ranger Operations and Fire Station would be added. Additional office space may be added as needed to accommodate the existing and growing shortage of work space. The existing campground and residential facilities would remain.</p> <p>The area road network would remain the same. Signs would be improved to better direct visitors to visitor use areas and facilities.</p>
-------------------	---	---

Topics	Alternative 1: The Preferred Future	Alternative 2: A Continuation of Existing Conditions
<b>Quitobaquito Management Area</b>	A new trailhead and .7 mile walking trail would be developed to improve visitor experience and safety. Parking, interpretive information, and composting toilet facilities would be relocated about 3/4 miles north of the existing trailhead. Existing facilities would be removed and approximately 23 acres restored to natural conditions. Administrative vehicle access to the international boundary would need to be maintained which could reduce the number of acres to be restored.	Due to safety concerns, the area would be staffed during daylight hours of the high visitation period. The existing vehicle circulation and parking space definitions would be improved, toilet facilities moved to a less conspicuous location, and an orientation sign with information dispenser added.
<b>Lukeville</b>	The NPS would provide assistance to improve visitor experience and establish linkages between Lukeville and the park. This would include assessing opportunities for interpretive services, eco-tourism related travel, and applying sustainable design guidelines. In the future, the NPS would offer support towards efforts of the establishment of a tri-nation information and orientation station.	The park would continue to implement the basic concepts identified in the 1978 DCP. This includes pursuing the purchase of all remaining private lands. The National Park Service would not locate employee housing and maintenance facilities in this area, as called for in this DCP, due to security and safety concerns.
<b>NAME, BOUNDARY, AND WILDERNESS AREA CHANGES</b>		
<b>Redesignation</b>	The NPS would support redesignating the monument as Sonoran Desert National Park, which would require congressional legislation. The new name would help the park work more effectively to preserve the Sonoran Desert ecosystem by drawing attention to the significance and value of its varied resources and by facilitating international and interagency cooperation.	The name would remain Organ Pipe Cactus National Monument.
<b>Boundary Adjustments</b>	An equal number of acres along the crest of the Ajo Mountains would be exchanged with the Gu Vo District of the Tohono O'odham Nation. The Tohono O'odham would receive 1502.6 acres along the eastern portion of the divide in exchange for 825.5 acres along the western side and 677.1 acres from the western part of the Gunsight Hills for the National Park Service.	No adjustments to the current boundaries would occur.
<b>Wilderness Area Additions</b>	After actions proposed by the plan are implemented, the following areas would be proposed for wilderness designation: - 1,280 acres in two land parcels held by the State and currently designated "potential wilderness", - 605 acres along the relocated powerline, - 1502.6 acres received from the land exchange with the Tohono O'odham Nation, - 23 acres of restored lands in the Quitobaquito area.	As in Alternative 1, the following area would be proposed for wilderness designation: - 1,280 acres in two land parcels held by the State that are currently designated "potential wilderness".

Topics	Alternative 1: The Preferred Future	Alternative 2: A Continuation of Existing Conditions
<b>PLAN IMPLEMENTATION and COSTS</b>		
<b>Implementation Strategy</b>	Development, program, and staffing additions would be implemented primarily as funding becomes available. The highest development priority is construction of the Ranger Operations and Fire Station. Specific cultural and resource management projects are prioritized in the NCRMP and would be revised during updates.	As for Alternative 1, development, program, and staffing would be implemented as funding is available. The highest development priorities are construction of the Ranger Operations and Fire Station and the new modular office building in the Twin Peaks area.
<b>Development Costs</b>	<p>General developments, park-wide: \$ 2,604,000</p> <p>Total for Twin Peaks Area (developments include the Visitor Center, Science and Resources Management Center with Greenhouse and Nursery, Employee Housing, Community Center, Campground and Amphitheater, and Ranger Operations, and Fire Station): \$14,544,000</p> <p>Alamo Wash Campground: \$120,600</p> <p>Quitobaquito Management Area: \$414,400</p>	<p>General developments, park-wide: \$314,400</p> <p>Twin Peaks Area (developments include Visitor Center upgrades, Modular Office building, Amphitheater, and Ranger Operations and Fire Station): \$3,260,000</p> <p>Quitobaquito Management Area: \$127,000</p>
<b>Operational Costs</b>	Estimated total cost of 36 FTEs plus related expenses: \$1,930,000 (Note: this figure includes the amount needed to satisfy existing conditions.)	Estimated total costs of adding 27.3 FTEs plus related expenses: \$1,537,000

## SUMMARY COMPARISON of CONSEQUENCES

Topics	Alternative 1: The Preferred Future	Alternative 2: Continuation of Existing Conditions
<b>Wilderness</b>	Protection of the Organ Pipe Cactus Wilderness would be maximized by eliminating or minimizing intrusions and increasing the acreage that qualifies as wilderness by approximately 2,130 acres. Indirect impacts on wilderness values that may occur due to the proximity of human intrusions to designated wilderness, would be mitigated to minimize adverse affects.	Actions described under this alternative would also have similar impacts as in Alternative 1, except that no additional acreage would qualify as wilderness.
<b>Air Quality</b>	In-park sources of pollution are minimal. Redesignation of the monument from a class II to a class I airshed area would provide <i>maximum protection of the monument's air quality</i> . However, this would be insufficient in preventing further degradation of air quality or visibility from Mexico.	Impacts on air quality and related values would be the same as Alternative 1.
<b>Floodplains, Wetlands, and Water Resources</b>	Implementing this alternative would have no effect on regulatory floodplains or surface and groundwater quality. Pending implementation of conservation measures, there would be only a slight increase in water consumption. Establishment of a well-defined trail network at Quitobaquito would have a positive impact on wetland functions and values.	As with Alternative 1, no effect on floodplains or water quality would occur. However, a lack of improvements to the trail system at Quitobaquito would allow for continuous vegetation trampling, creating a potentially adverse impact on the wetland's function and value as wildlife habitat.
<b>Threatened, Endangered, and Sensitive Species</b>	The establishment of a well-defined trail system at Quitobaquito would have a beneficial effect on habitat for the Sonoran mud turtle, Quitobaquito snail, and the Quitobaquito desert pupfish. The lesser long-nosed bat could be adversely affected if the expansion of Alamo Canyon campground leads to increased human use at the nearby roost site. Continued use of State Route 85 by large volumes of traffic travelling at excessive speeds could be expected to eventually eliminate the Mexican rosy boa from this road corridor area, and impact other species. An increase in patrol efforts in known problem areas and lowering the speed limit on the road would help combat the poaching problem.	The Sonoran mud turtle, Quitobaquito desert pupfish, and Quitobaquito desert snail would be adversely impacted by the continued disturbance and trampling of the pond's littoral zone, an area that provides important foraging, spawning, and resting habitat. The Sonoran mud turtle population may face extirpation. Current traffic levels and speed would eventually eliminate the Mexican rosy boa along State Route 85. While patrol efforts may shift, there would be little progress made to combat poaching.

Topics	Alternative 1: The Preferred Future	Alternative 2: Continuation of Existing Conditions
<b>Wildlife</b>	Proposed developments would not occur in areas which would result in additional loss of habitat for wildlife. Attempts would be made to schedule construction activities so that they did not interfere with breeding, nesting, or parturition. Continuing to eliminate human-provided water sources may reduce populations of avian species to more natural levels and may decrease the attractiveness of such areas to the Africanized honey bee. As described previously, the new trail network at Quitobaquito would reduce trampling of wildlife habitat and high mortality rates along State Route 85 would continue.	There is no significant difference between this alternative and Alternative 1 with the exception of impacts on wildlife inhabiting the littoral zone of Quitobaquito pond. Continued disturbance to aquatic vegetation would degrade the quality of foraging, nesting habitat, and protective cover.
<b>Vegetation</b>	There would be no significant impact on the monument's floral diversity or amount of soil subject to erosion. The disturbance or loss of 58 acres of Sonoran desert vegetation would be offset by revegetation of 229 acres, for a net increase of 171 acres. The establishment of designated pullouts on State Route 85 would reduce vegetation disturbance in that corridor.	There would not be a significant impact on the monument's floral diversity or the amount of soil subject to erosion. The persistence of undesignated pullouts on State Route 85 would continue the vegetation disturbance in this area.
<b>Cultural Resources</b>	Knowledge, protection, and preservation of important cultural resources would be enhanced. The prescribed treatments would reduce the loss of historic fabric from many significant historic sites and structures. Surveys would mitigate possible impacts from developments, allowing significant areas to be avoided. They would also contribute to an improved understanding the park's history.	The management, protection, and preservation of important cultural resources would be enhanced, but not to the degree in Alternative 1.
<b>Visitor Use and Experience</b>	Implementing this alternative and existing trends will lead to increased visitation. New facilities, including trails, could allow visitors to experience uncrowded and safer conditions. There would be more opportunities for understanding the significance of the historical, cultural, and natural values of the park and its part in an international network of public preserves. The effects of heavy truck congestion associated with NAFTA may have a negative long-term impact on visitor levels.	Based on current trends, visitation is expected to increase by not as much as in Alternative 1. Existing visitor and administrative facilities may be inadequate to provide visitors with a favorable experience. Visitor security problems at Quitobaquito may remain. As with Alternative 1, NAFTA may have a negative long-term impact on visitor levels.
<b>Socioeconomy</b>	Increased visitation levels, and construction and operation of facilities in this alternative could provide moderate economic benefits to the local and regional economy. Increased sales tax, revenues, and new jobs are expected for the short and long-term.	Economic benefits resulting from this alternative would be generated primarily through increased housing demands in the surrounding communities based on the increased staffing at the monument.

<p><b>Cumulative Impacts</b></p>	<p>The cumulative effect of all actions would be to enhance protection, understanding, and recognition of the Sonoran desert ecosystem and further strengthen relations with the Tohono O'odham nation and Mexico.</p> <p>Proposed actions would add to demands on the regional resources (e.g. groundwater consumption, habitat loss, air quality degradation) to a relatively minor extent. Despite a negligible loss of wildlife habitat, excessive mortality along State Route 85 would continue to decimate all forms of wildlife along this corridor, possibly eliminating some species from this portion of their range and reducing their genetic variability and reproductive fitness. Gains made in combatting poaching of rare flora and fauna may be negated if it merely results in a shift of the problem to less protected areas in the region. The importance of understanding the need to preserve the cultural heritage of the Sonoran Desert ecosystem would be perpetuated through increased preservation, research and interpretation. Revenues to the local and regional economy would continue to increase as visitation and government hiring and expenditures increase.</p> <p>On a broader scale, the proposed actions would involve no net loss to the nation's remaining wetland acreage, and could eventually lead to an expansion of the National Wilderness Preservation System by approximately 2,130 acres. Enhanced habitat protection for the endemic Quitobaquito snail and Quitobaquito desert pupfish would help perpetuate their existences.</p>	<p>There would be similar effects with the actions taken in this alternative—to a lesser degree—with two primary exceptions. There would not be a reduction in the amount of rare flora and fauna lost to poachers. And on the broader scale, no expansion of the National Wilderness Preservation System would occur. Persistent degradation of the only know habitat for the Quitobaquito desert pupfish and the Quitobaquito snail could potentially jeopardize their continued existence.</p>
----------------------------------	---	---

## RESUMEN

Organ Pipe Cactus National Monument (ORPI) fue creado por una Proclamación Presidencial en el año 1937 para preservar aproximadamente 133,825 hectáreas del Desierto Sonorense para beneficio público. El Parque es administrado por el National Park Service (NPS), y se encuentra en el sudoeste del estado de Arizona en la frontera internacional con México. Abarca una amplia gama de recursos ecológicos y culturales de valor incluyendo el pez cachorro del desierto en Quitobaquito, una especie en peligro, y sitios arqueológicos y etnográficos de importancia. Algunos de estos sitios aún son usados por los descendientes de los Tohono O'odham cuya reservación, de más de 1.1 millones de hectáreas, colinda con el lado oriental del parque. Visitantes, científicos e investigadores llegan para observar los recursos únicos del sitio y disfrutar del silencio y la soledad que se encuentra en ORPI. En 1976 ORPI fue designado como Reserva de la Biosfera dentro del programa del Hombre en la Biosfera de la UNESCO. Con el aumento constante en el número de visitantes al área, las instalaciones no han logrado adecuarse a la demanda. Asimismo, los recursos naturales, incluyendo el Ojo de Quitobaquito cerca de la carretera 85, han sufrido de este alud de visitantes.

Se desarrollaron dos "futuras" alternativas para responder a la necesidad de un cambio y explorar formas de preservar los recursos del Desierto Sonorense. Se consideraron muchas alternativas durante este proceso de planeación iniciado en 1987. No obstante, una vez que el NPS definió el propósito y la importancia del parque y se revisó cuidadosamente el Acta de Sitios Silvestres, se redujo considerablemente el número de opciones para una administración apropiada. *La Alternativa 1: El Futuro Preferido*, representa la línea de acción propuesta por el NPS. Esta alternativa también representa las acciones y el desarrollo que se requieren para que el parque funcione en una forma que mejor responda al uso primario para visitantes, la administración del área y la protección de los recursos. *Alternativa 2: Una Continuación de las Condiciones Actuales* representa una alternativa de no actuar y se basa principalmente en continuar la administración de acuerdo con la descripción de los documentos actuales.

En las páginas que siguen se resumen las alternativas y las consecuencias de su instrumentación. Se presentan en forma de cuadro para ayudar al lector a comparar las alternativas y las consecuencias de la instrumentación de cada alternativa. Para mayor información acerca de un tema específico, el lector debe consultar la sección del documento que corresponde.

### RESUMEN DE COMPARACION DE ALTERNATIVAS

Temas	Alternativa 1: El Futuro Preferido	Alternativa 2: Una Continuación de las Condiciones Actuales
<b>EL USO DE LAS TIERRAS Y SU ADMINISTRACIÓN</b>		
<b>Zonas de Administración</b>	Modifica las zonas que ya existen en base a la legislación, el propósito del parque y su importancia y la experiencia de los visitantes. Las zonas y subzonas que se proponen incluyen: Zona Silvestre Zona Silvestre Potencial Área Administrativa Quitobaquito no-Silvestre Zona: Corredor de Viajes Área de Desarrollo Zona Cultural	La zona administrativa que ya existe permanecería. Las zonas y subzonas incluyen:  Zona Natural: Subzona Silvestre Ambiente Natural Subzona Zona Histórica Zona de Desarrollo Zona de Uso Especial: Subzona desarrollo Privado Terrenos Estatales Subzona Reserva de Aduana y Migración EE.UU.

Temas	Alternativa 1: El Futuro Preferido	Alternativa 2: Una Continuación de las Condiciones Actuales
<b>ADMINISTRACIÓN DE RECURSOS</b>		
<b>Plan de Administración de Recursos Naturales y Culturales (1994)</b>	El Plan de Administración de Recursos Naturales y Culturales (siglas NCRMP en Inglés) continuaría guiando la administración de los recursos naturales y culturales del parque. Esta alternativa propone acciones adicionales que no están identificados en el NCRMP.	Como en la Alternativa 1, el NCRMP guiaría la administración del programa de recursos. Ciertas acciones ayudarían a resolver temas identificados durante la revisión de este plan general de administración incluyendo: establecer un programa integral e inclusivo de la Administración de Recursos, la ampliación del programa de Monitoreo Ecológico e incrementar las acciones para preservar los recursos aire y agua.
<b>Centro de Recursos</b>	Se construiría un nuevo Centro de Administración de Ciencia y Recursos de 1,115 metros cuadrados, un invernadero de 150 metros cuadrados y un vivero de 335 metros cuadrados que serviría para: Concentrar las funciones de la administración de los recursos naturales y culturales en sitio;  suministraría un foro y espacio para los científicos e investigadores; ofrecería a los visitantes del parque con un mejor entendimiento del ecosistema del Desierto Sonorense y las actividades del parque para su protección. El Centro incluiría oficinas, un salón de conferencias, laboratorios, almacén nuseográfico, archivero, biblioteca y salones de trabajo. Las residencias que ahora funcionan como centros regresarían a su función de residencias para los empleados.	Las residencias de familia individual que funcionan actualmente como centros de recursos, permanecerían. Se podrán agregar otras estructuras cuando se incremente el personal del parque.
<b>Recursos Culturales</b>	Se propone la preservación y designación para las siguientes propiedades de significado cultural: Bates Well Ranch, Pastura Bull, Rancho Dos Lomitas, Pozo Gachado y Campamento Line, Mina Growler y Distrito de Minas, I'ittoi Mo'o (Cabeza de Moctezuma), Mina, Ojo de Quitobaquito, Mina Victoria, Recursos Hidráulicos Históricos, Camino del Pozo Wall's Well-Bates, las mojoneras Internacionales de la Frontera, El Camino del Diablo, y los Campamentos de Ranching Line.  Se continuaría la evaluación de los recursos culturales para posible inclusión en el Registro Nacional y se buscarían restos arqueológicos en los nuevos desarrollos antes de cualquier construcción y asegurar la mitigación de cualquier impacto potencial sobre estos recursos.	En relación a la Alternativa 1, se continuarían las evaluaciones de los recursos culturales para posible inclusión en el Registro nacional. Se rastrearían restos arqueológicos en los nuevos desarrollos para restos arqueológicos antes de iniciar cualquier construcción y asegurar la mitigación de cualquier impacto potencial sobre estos recursos.  Se continuaría con la estabilización de las propiedades históricas en lista o elegibles para el Registro de Sitios Históricos cuando hubieran fondos.

Temas	Alternativa 1: El Futuro Preferido	Alternativa 2: Una Continuación de las Condiciones Actuales
<b>Consulta con los Naturales</b>	Se fortalecería el esfuerzo actual con la firma de un convenio para identificar y proteger sitios culturales importantes en el parque. Este convenio definiría los procesos cuando el parque compartiera información, asesorar en los hallazgos y solicitar consejo en la forma apropiada de interpretación de los materiales.	Consultación con el grupo Indio Americano sigue creciendo.
<b>Preservación del Paisaje Visual</b>	Se proponen dos acciones para auxiliar la preservación de los recursos visuales del paisaje del Desierto Sonorense: reubicar y reinstalar líneas eléctricas subterráneas cuando se programe su sustitución e instrumentar pautas y prácticas de diseño en las nuevas instalaciones.	No se tomarían ningunas medidas adicionales para mejorar la preservación del paisaje visual.

#### LA EXPERIENCIA DE LOS VISITORES Y LAS INSTALACIONES ASOCIADAS

<b>Interpretación</b>	<p><b>Objetivos y Temas.</b> El folleto Interpretativo (1993) desarrolló nuevos objetivos y temas y guiará el programa interpretativo del parque.</p> <p><b>Instalaciones y Programas</b> Para lograr los objetivos y los temas se propone las siguientes instalaciones y programas nuevos:</p> <ul style="list-style-type: none"> <li>- un centro de visitantes de 560 metros cuadrados con un vestíbulo, centro de información, tienda, sala de exhibiciones, un patio al aire libre, teatro, sanitarios y un sendero interpretativo corto accesible a los visitantes con limitantes físicos</li> <li>- un vestíbulo con exhibiciones, un salón de usos múltiples en el nuevo Centro de Administración de Ciencia y Recursos;</li> <li>- rehabilitar el sitio de acampar y el área de anfiteatro incluyendo una ampliación del parque de estacionamiento;</li> <li>- nuevas exhibiciones en los parajes y caminos escénicos y varios aspectos claves de los recursos; y</li> <li>- una ampliación de los programas de colaboradores y extensión.</li> </ul>	<p><b>Objetivos y Temas.</b></p> <p>Como en Alternativa 1, para los objetivos y los temas del Plan de Interpretación, se emplearía el folleto de interpretación para guiar el programa interpretativo.</p> <p><b>Instalaciones y Programas.</b> En la actualidad el parque instrumenta instalaciones y programas provisionales que incluyen:</p> <ul style="list-style-type: none"> <li>- recientes mejoras en el teatro, la exhibición de transparencias y las exhibiciones en el centro de visitantes,</li> <li>- mejoras en el área del anfiteatro del campamento como en Alternativa 1 y</li> <li>- también en alternativa 1, la expansión de los programas de extensión que responden a la designación como Reserva de la Biosfera.</li> </ul>
-----------------------	---	---

Temas	Alternativa 1: El Futuro Preferido	Alternativa 2: Una Continuación de las Condiciones Actuales
<b>Acampar</b>	<p>Se incrementarían las oportunidades para acampar en estilo primitivo cerca de estacionamientos. En el campamento Twin Peaks se desarrollarían 20 nuevos campamentos, accesibles a peatones, para el cañón dentro del campamento que ya existe.</p> <p>Se ampliaría el parque de estacionamiento que ya existe para acomodar 20 vehículos más se agregaría un sanitario.</p> <p>En el Campamento Arroyo de Alamo Cañón se agregarían 4 espacios, cada uno con un estacionamiento, una mesa de meriendas, un círculo para fogata y tambos para desechos, y se agregaría un sanitario de composta.</p> <p>Se designaría un área de estacionamiento para seis vehículos dentro del camino circular para uso solamente durante el día.</p> <p>Antes de añadir campamentos adicionales se establecería la capacidad de carga de visitantes basada en la experiencia de los visitantes y la protección de los recursos.</p>	<p>No se afectarían las instalaciones que ya existen en Twin Peaks y el Arroyo del Cañón del Alamo.</p>
<b>Red de transporte del Área Carretera Estatal 85.</b>	<p><b>Carretera Estatal 85.</b> El NPS fomentaría un esfuerzo de planeación colaborativa para encontrar soluciones que lograrán una mayor compatibilidad de esta carretera con los valores naturales, mejor protección de los recursos en forma compatible con los valores naturales y mejorar la seguridad de los visitantes y los residentes.</p> <p>Este esfuerzo de planeación pudiera incluir la búsqueda de alternativas para la ruta de la carretera y un puerto de entrada comercial y otro tráfico de paso. Hasta que se logre esto el NPS colaborará con las dependencias Estatales y Regionales responsables del transporte para reducir el impacto actual de la carretera en los visitantes, los recursos y los valores naturales.</p> <p>Las acciones incluirían: instalar rótulos en las entradas, reducir el límite de velocidad a 60 Kms/p/h y, de poder reducir el límite, crear parajes en el acotamiento con mensajes interpretativos.</p> <p><b>Senderos.</b> Se proponen once senderos formales nuevos, con un total de 45 Kms, para ofrecer a los visitantes acceso a los recursos y un mejor entendimiento de los temas interpretativos del parque. Se mejoraría la rotulación y la descripción de las rutas de los senderos informales ya en existencia.</p>	<p><b>Carretera Estatal 85.</b> El parque colaboraría estrechamente con el Estado y otras dependencias para reducir a un mínimo los impactos de las mejoras que se proponen por motivo del aumento en tráfico.</p> <p><b>Senderos.</b> Se harían mejoras a los senderos formales que ya existen y lograr que dos de estos senderos sean accesibles para sillas de ruedas, instalación de rótulos, exhibiciones en cuatro de los senderos y una extensión del Sendero natural del Centro de Visitantes.</p> <p>De acuerdo con la Alternativa 1, los senderos informales que ya existen permanecerían como están.</p>

Temas	Alternativa 1: El Futuro Preferido	Alternativa 2: Una Continuación de las Condiciones Actuales
<b>LAS OPERACIONES DEL PARQUE Y LAS INSTALACIONES ASOCIADAS</b>		
<b>Personal</b>	Se requieren aproximadamente 36 empleados de tiempo completo para instrumentar esta alternativa. Esta cifra incluye los que se necesitan para satisfacer las condiciones actuales. el programa de Personas Muy Importantes (VIP siglas en Inglés) continuaría utilizando voluntarios para no agregar empleados ante a las necesidades en el aumento de los programas.	Se requieren aproximadamente 27.3 Empleados de Tiempo Completo para instrumentar esta alternativa. Lo mismo que en Alternativa , el parque continuaría empleando VIPs. Este numero de empleados sería agregado al número que se requiere para satisfacer las condiciones actuales.
<b>Instalaciones</b>	Se construirían nuevas instalaciones y se mejorarían las que ya existen para satisfacer las necesidades actuales y futuras, separar las áreas de uso de los empleados y de los visitantes y, además, ofrecer un ambiente de trabajo más eficiente, productivo y seguro. Se rehabilitaría el actual Centro de Visitantes y centro administrativo de 500 metros cuadrados para convertirlo en un centro administrativo, se construiría un edificio 460 metros cuadrados dedicado a los guarda parques y bomberos con un campo para helicópteros y se ampliaría el actual área de mantenimiento para incluir 186 metros cuadrados de oficina y área de trabajo y 850 metros cuadrados de estacionamiento cubierto y 280 metros cuadrados de almacenamiento.	Permanecerían las instalaciones que ya existen para administración y mantenimiento. De acuerdo con la descripción de Alternativa 1, se agregará un nuevo centro de operaciones de los guardaparques y un edificio de bomberos de 279metros cuadrados para responder a las necesidades de espacio.
<b>Residencias del Personal</b>	A la zona residencial se agregaría que ya existe en Twin Peaks: cuatro residencias rehabilitadas para una familia cada una, diez apartamentos en uno o dos edificios con estacionamiento techado para los empleados o científicos visitantes; un edificio de servicio con lavandería y regaderas, una antena de satélite y un edificio Comunitario nuevo de 140 metros cuadrados con sitio para estacionar veinte vehículos, un patio de recreo, una cancha de voleibol y un asador. Se completarían las demandas para residencias adicionales dentro del mercado de bienes raíces en Ajo, Why y Lukeville.	Permanecería la zona residencial que existe. Como en Alternativa 1, las necesidades residenciales adicionales se completarían dentro del mercado en Ajo, Why y Lukeville.

Temas	Alternativa 1: El Futuro Preferido	Alternativa 2: Una Continuación de las Condiciones Actuales
<b>Administración Colaborativa</b>	Continuar ejerciendo un papel central y colaborativo con la Alianza y otros grupos interesados en la protección y administración de los recursos en la región del Desierto Sonorense. Desarrollar un plan de acción para subrayar la importancia de programa del Hombre en la Biosfera MAB incluyendo programas conjuntos con las reservas en México. Contratar un especialista en relaciones internacionales /administrador auxiliar/ planeación comunitaria para trabajar mancomunadamente con la Alianza, desarrollar el plan del MAB y coordinar las actividades de otras dependencias, comunidades y naciones.	Lo mismo que en Alternativa 1, se continuaría la colaboración con la Alianza y se desarrollaría un plan de acción para reforzar la importancia del MAB.
<b>PLANES DEL CONCEPTO DE DESARROLLO</b>		
<b>Twin Peaks</b>	<p>De acuerdo con la descripciones en las secciones anteriores, se proponen varios desarrollos para responder a las necesidades que genera la expansión de visitantes, personal del parque y la comunidad científica.</p> <p>Todas las instalaciones se encuentran fuera de la zona de probables inundaciones. El nuevo Centro de Visitantes, el Centro de Ciencia/ Conferencias y la instalación Administrativa rehabilitada se convertirían en un complejo central e incluirían un paraje para meriendas con 6 mesas con albergue y un estacionamiento que acomodaría camiones de pasajeros y vehículos recreativos de mayor tamaño. Se establecería una zona de estacionamiento para empleados del otro lado del complejo. Se ubicaría el Centro de Operaciones de los Guardaparques y la Estación de Bomberos cerca y se incluiría un estacionamiento para diez vehículos.</p> <p>La ampliación de la instalaciones para el mantenimiento así como un área residencial se construirían cerca de su sitio actual y en áreas donde el entorno natural ya hubieran sido afectada.</p> <p>Se cambiaría la red de caminos para separar las áreas de visitantes de los sitios que utilizan los empleados.</p> <p>Se construiría un nuevo camino de .8 kilómetros y se eliminarían 460 metros de camino de dos carriles y se restauraría la condición natural del área. Los visitantes y los empleados del parque tendrían diferente acceso a los estacionamientos.</p> <p>Una nueva entrada, mejor identificación y un área para cambio de dirección de tráfico en la entrada de Puerto Blanco facilitaría el cambio de rumbo para visitantes que decidieran no recorrer el camino al Puerto.</p>	<p>Se mantendría el actual edificio que combina el centro de visitantes y la administración. Se agregaría un nuevo edificio modular para oficinas, las operaciones de los guardabosques y la estación de bomberos.</p> <p>Se agregarían oficinas de acuerdo con las necesidades para remediar la escasez de espacio para este propósito. El campamento y las instalaciones residenciales permanecerían.</p> <p>La red de caminos no sería afectada. Se mejorarían los rótulos para mejor orientar a los visitantes en el uso de las instalaciones y las facilidades.</p>

Temas	Alternativa 1: El Futuro Preferido	Alternativa 2: Una Continuación de las Condiciones Actuales
<b>Áreas de Administración de Quitobaquito</b>	Se desarrollaría un nuevo sendero para peatones de 1 kilómetro para ampliar la experiencia y la seguridad de los visitantes. Se reubicarían los estacionamientos, la información interpretativa y el sanitario de composta aproximadamente 1 kilómetro hacia el norte del inicio del sendero actual. Se eliminarían las instalaciones que existen y se restaurarían aproximadamente 9 hectáreas a su condición natural. Se necesitaría mantener el acceso de vehículos a la línea internacional, por lo tanto se reduciría la cantidad de terreno restaurado a su condición natural.	Por razones de seguridad el área sería patrullada durante las horas de luz diurna en los períodos de muchas visitas. Se mejorarían la circulación y los estacionamientos para vehículos, se trasladarían los sanitarios a un sitio menos visible y se agregaría un rótulo de orientación y sitio para distribuir folletería.
<b>Lukeville</b>	El NPS ayudaría para mejorar la experiencia de los visitantes y establecer vinculación entre Lukeville y el parque. Esto incluiría una evaluación de las oportunidades para información interpretativa, ecoturismo y temas relacionados, y la instrumentación de pautas para un diseño sustentable. En el futuro el NPS ofrecería apoyo para la creación de un centro de información incluyendo información trinacional.	El parque continuaría instrumentando los conceptos básicos identificados en el plan de desarrollo de 1978. Esto incluye un seguimiento en la compra de todos los terrenos que se mantienen en el sector privado. El NPS no edificaría residencias de empleados o de mantenimiento en esta zona como se indicó en el mencionado plan de 1978, por razones de seguridad.

**CAMBIOS DE NOMBRE, COLINDANCIAS Y ZONA SILVESTRE**

<b>Redesignación</b>	El NPS apoyaría la redesignación del monumento como el parque nacional del Desierto Sonorense, una acción que requeriría legislación del Congreso Estadounidense. Este nuevo nombre ayudaría a que el parque pudiera ser más eficaz en su labor de proteger el ecosistema del Desierto Sonorense con un enfoque en el significado y el valor de sus variados recursos y promover la colaboración internacional e intersecretarial.	Se mantendría el nombre de Organ Pipe Cactus National Monument.
<b>Ajustes en las Colindancias</b>	Se efectuaría un trueque de tierra en la cima de las Montañas Ajo con el Distrito Gu Vo de la Nación Tohono O'dham. La Nación O'dham recibiría poco más de 600 hectáreas en la parte oriental de la cima a cambio de 334 hectáreas en la parte occidental y 274 hectáreas en la parte occidental de Gunsight Hills para el National Park Service.	No se contemplan ajustes en la colindancias actuales.

Temas	Alternativa 1: El Futuro Preferido	Alternativa 2: Una Continuación de las Condiciones Actuales
<b>Agregados al Área Silvestre</b>	Después que se instrumenten las acciones propuestas en este plan se propondrían las siguientes áreas para designación de zona silvestre: - 518 hectáreas en dos parcelas de terreno del Estado que actualmente se denominan "Zona silvestre potencial", - 245 hectáreas en el terreno debajo de la línea eléctrica reubicada, - 608 hectáreas obtenidas de un trueque de terrenos con la Nación O'odham, - 9 hectáreas de terrenos restaurados en la región de Quitobaquito.	Como en la Alternativa 1, se proponen las siguientes áreas para designación como zonas silvestres: 518 hectáreas en dos parcelas a cargo del Estado que se han designado como "zonas silvestres de potencial"
<b>INSTRUMENTACIÓN DEL PLAN Y SUS COSTOS</b>		
<b>Estrategia de instrumentación</b>	Se instrumentarían el desarrollo, programas y aumento en personal de acuerdo con los fondos disponibles. La más alta prioridad es la construcción del Centro de Operaciones de Guardabosques y la Estación de Bomberos. Los proyectos culturales y administración de recursos específicos se encuentran en orden de prioridad dentro del Plan de Administración de Recursos Naturales y serían ajustados durante la instrumentación de los planes.	Las más altas prioridades de construcción son el Centro de Operaciones de los Guardaparques y la nueva oficina modular en el área de Twin Peaks.
<b>Costos del Desarrollo</b>	Desarrollo General en todo el parque: \$2,604,000  Total para la zona de Twin Peaks (desarrollos incluyen el Centro de Visitantes, el Centro de Administración de Ciencia y Recursos con el invernadero, residencias de empleados, el Centro Comunitario, Campamento y Anfiteatro, Operaciones de los Guardaparques y la Estación de Bomberos): \$14,544,000  Campamento del Arroyo Alamo: \$120,600  Área de Administración de Quitobaquito: \$414,400	Desarrollo general del: \$314,400  Desarrollo de la Zona de Twin Peaks (desarrollo incluye las mejoras al Centro de Visitantes, Edificio modular para oficinas, Anfiteatro y Operaciones de guardabosques y Estación de Bomberos): \$3,260,000  El Áreas de administración de Quitobaquito: \$127,000
<b>Costos de Operación</b>	Costo estimado de 36 empleados de tiempo completo más prestaciones: \$1,930,000 (Nota: esta cifra incluye la cantidad para satisfacer las condiciones actuales.)	Costo total estimado de agregar 27.3 empleados de tiempo completo más prestaciones: \$1,537,000

## RESUMEN COMPARATIVO DE CONSECUENCIAS

Temas	Alternativa 1: El Futuro Preferido	Alternativa 2: Continuación de las Condiciones Actuales
<b>Zona Silvestre</b>	Se proporcionaría la mayor protección a la Zona Silvestre de Organ Pipe Cactus al eliminar o reducir las intrusiones y aumentando la superficie que se califica como silvestre en 816 hectáreas. Se reducirían los impactos indirectos en la zona designada como silvestre causados por la cercanía de la presencia humana.	Las acciones que se describen dentro de esta alternativa representan impactos semejantes a la Alternativa 1, sin un aumento en la superficie que se calificaría como silvestre.
<b>Calidad del Aire</b>	Las fuentes de contaminación dentro del parque son mínimas. Una redesignación de la cuenca de drenaje de aire del monumento de clase II a clase I proporcionaría máxima protección a la calidad del aire del monumento  No obstante, esto sería insuficiente para prevenir degradación adicional de la calidad del aire y la visibilidad resultado de éstas en México.	Los impactos en la calidad del aire y valores relacionados serían los mismos que en Alternativa 1.
<b>Áreas de Inundación, Humedales y Recursos Hidráulicos</b>	La instrumentación de esta alternativa no resultaría en ningún efecto en la reglamentación de áreas de inundación o la calidad de acuíferos hasta que se instrumenten las medidas de conservación se incrementarían levemente los niveles de consumo de agua. La creación de una red de senderos en Quitobaquito tendría un impacto positivo en el funcionamiento del humedal y los valores que éstos representan.	Lo mismo que con Alternativa 1, no tendría efecto en el área de inundación o en la calidad del agua. No obstante, la ausencia de mejoras en la red de senderos en permitiría el constante pisoteo de la vegetación, afectando adversamente la función y el valor del humedal.
<b>Especies Amenazadas, en Peligro y sensibles</b>	La creación de un sistema de senderos bien definidos en Quitobaquito tendría un efecto positivo en el hábitat de la tortuga de marismas Sonorense, el caracol de Quitobaquito y el pez cachorro del desierto. Si la ampliación del campamento del Cañón de Alamo condujera a un mayor uso del público el varal del murciélago narigudo se vería afectado en forma negativa. El uso intensivo de la carretera 85 por vehículos conducidos a alta velocidad pudiera, eventualmente, llevar a la eliminación de la boa rosada en este corredor e impactar a otras especies. Asimismo, un aumento en patrullas de zonas problemáticas a reducción en el límite de velocidad pudiera combatir el problema de la caza furtiva.	El pisoteo de la zona litoral de Quitobaquito, afectaría adversamente las poblaciones de la tortuga de marismas Sonorense, el caracol de Quitobaquito y el pez cachorro del desierto. Esta área suministra un hábitat para alimento, reproducción y descanso para estas especies. Puede ser que la tortuga de marismas se enfrente a su eliminación. Los niveles de tráfico y las velocidades actuales eventualmente eliminarían la boa rosada mexicana en la carretera 85. Aún con un cambio en las patrullas, poco se puede hacer para combatir la caza furtiva.

Temas	Alternativa 1: El Futuro Preferido	Alternativa 2: Continuación de las Condiciones Actuales
<b>Vida Silvestre</b>	El desarrollo que se propone no se instrumentaría en áreas que resultarían en la pérdida de hábitats o vida silvestre. Se programarían las actividades de construcción para que no afectaran la reproducción, anidación o el parto de los animales. La eliminación de fuentes de agua creadas por el ser humano pudiera reducir las poblaciones de especies de aves a niveles más naturales y reducir el atractivo de tales áreas para la abeja africana. Como se describió anteriormente, la nueva red de senderos en Quitobaquito reduciría el pisoteo del hábitat natural pero continuarían los altos niveles de mortandad en la carretera 85.	El desarrollo que se propone no se instrumentaría en áreas que resultarían en la pérdida de hábitats o vida silvestre. Se programarían las actividades de construcción para que no afectaran la reproducción, anidación o el parto de los animales. La eliminación de fuentes de agua creadas por el ser humano pudiera reducir las poblaciones de especies de aves a niveles más naturales y reducir el atractivo de tales áreas para la abeja africana. Como se describió anteriormente, la nueva red de senderos en Quitobaquito reduciría el pisoteo del hábitat natural pero continuarían los altos niveles de mortandad en la carretera 85.
<b>Vegetación</b>	No habría ningún impacto significativo en la diversidad de flora o la intensidad de erosión del suelo en el monumento. Se equilibraría la alteración o pérdida de 23 hectáreas de vegetación del desierto Sonorense con la revegetación de 93 hectáreas para un aumento neto de 69 hectáreas. La creación de sitios de estacionamiento temporales en los acotamientos de la carretera reduciría el efecto sobre la vegetación en este corredor.	No habría ningún impacto significativo en la diversidad de flora o la intensidad de erosión del suelo en el monumento. La existencia continua de sitios de estacionamiento temporal en el acotamiento de la carretera 85 continuaría la degradación de la vegetación en esta área.
<b>Recursos Culturales</b>	Se incrementarían el conocimiento, protección y preservación de importantes recursos naturales. Las técnicas que se aplicarían reducirían las pérdidas de importantes sitios y estructuras históricas y sus relaciones. Encuestas ayudarían a recabar información que reducirían los impactos de desarrollo y protegiendo zonas importantes. Asimismo, contribuirían a un mejor entendimiento de la historia del parque.	Se incrementarían la administración, la protección y la preservación de importantes recursos culturales, pero no al grado que ofrece Alternativa 1.
<b>El Uso y la Experiencia del Visitante</b>	La instrumentación de esta alternativa y las tendencias actuales llevaría a un mayor número de visitantes. Nuevas instalaciones, incluyendo senderos, permitirían a los visitantes una experiencia sin muchedumbres y condiciones más seguras. Habrían más oportunidades para entender el significado de los valores históricos, culturales y naturales del parque y su papel en una red internacional de reservas públicas. El tráfico de camiones de carga pesados asociados con el TLC puede representar un efecto negativo en los niveles de visitantes a largo plazo.	En base a los patrones de visita actuales se espera que estos no se incrementen tanto como en la Alternativa 1. Las instalaciones para visitantes y administrativas pueden ser inadecuadas para ofrecer al visitante una experiencia favorable. Los problemas de seguridad para visitantes a Quitobaquito pueden continuar. Como en Alternativa 1 el TLC puede ejercer un efecto negativo a largo plazo en el número de visitantes.

Temas	Alternativa 1: El Futuro Preferido	Alternativa 2: Continuación de las Condiciones Actuales
<b>Socioeconómica</b>	El aumento en número de visitantes, la construcción y la operación de instalaciones en esta alternativa pudiera ofrecer un moderado beneficio económico para la economía local y regional. Se prevé un aumento en impuestos sobre la venta, utilidades y nuevos empleos a corto y largo plazo.	Los beneficios económicos resultarían de un aumento en la demanda residencial en las comunidades aledañas en base a un incremento en el personal del monumento.
<b>Impactos Acumulativos</b>	<p>El efecto acumulativo de todas las acciones pudiera incrementar la protección, el entendimiento y el reconocimiento del ecosistema del desierto Sonorense y reforzar las relaciones con la Nación O'odham y México. Las acciones que se proponen repercutirían en forma mínima en la demanda de recursos regionales, (por ejemplo, consumo del agua de subsuelo, pérdida de hábitat, degradación de la calidad del aire). Aún con la mínima pérdida de hábitat silvestre, la excesiva mortandad en la Carretera 85 continuaría la diezma de la vida silvestre en este corredor, posiblemente eliminando algunas especies de esta sección de su área de distribución y reduciendo su variabilidad genética y capacidad para reproducir.</p> <p>Los avances que se logren en combatir la caza furtiva y el hurto de la flora se nulificarían si meramente se transfiera al problema a zonas menos protegidas en la región. Se perpetuaría el concepto de la importancia de entender y preservar el patrimonio cultural y los ecosistemas del desierto Sonorense por medio de la preservación, la investigación y la interpretación.</p> <p>Los ingresos locales y regionales continuarían en aumento de acuerdo con el aumento en visitantes y los empleos generados por la erogación gubernamental.</p> <p>En un marco más amplio, las acciones que se proponen no involucrarían ninguna pérdida neta de lo que permanece del patrimonio de superficie de humedales y pudiera eventualmente llevar a una expansión del Sistema nacional de Preservación Silvestre en un total de 862 hectáreas. Un incremento en la protección del hábitat de las especies endémicas del caracol y el pez cachorra de Quitobaquito pudiera auxiliar en la perpetuación de su existencia.</p>	<p>Los efectos de las acciones que resultarán de esta alternativa serían semejantes, en menor escala, con dos excepciones primarias.</p> <p>No habría reducción en la pérdida de especies de fauna y flora por concepto de caza furtiva y hurto de plantas y, en un marco más amplio, la degradación constante del único hábitat que se conoce para el pez cachorro del desierto y el caracol de Quitobaquito pueden potencialmente poner en peligro su existencia.</p>

## BACKGROUND

Organ Pipe Cactus National Monument (NM) was established by Presidential Proclamation in 1937 to preserve approximately 330,689 acres of Sonoran Desert for the public interest (see Appendix A). Managed by the National Park Service (NPS), the monument is located in southwestern Arizona on the international border with the state of Sonora, Mexico. Organ Pipe Cactus NM is about 150 miles southwest of Phoenix and 150 miles west of Tucson in the western portion of Pima County, Arizona's 2nd Congressional District.

Geographically, Organ Pipe Cactus NM lies near the center, or heart of the Sonoran Desert. This desert region covers approximately 76.4 million acres and encompasses an array of cultures, nations, and land uses. Although the park provides protection for only a small portion of this lush desert, it preserves many significant resources of that ecosystem and intersects with a variety of cultures. Park neighbors include:

- the communities of Ajo and Why to the north
- Bureau of Land Management lands also to the north
- the approximately 2.8 million acre Tohono O'odham Reservation to the east
- the Lukeville Port of Entry containing an 8.18 acre Customs and Immigration Reserve within the monument's southern boundary
- the unincorporated community of Lukeville adjacent to the Port of Entry and also within the boundary, consisting of approximately 65.33 acres of privately-owned lands used primarily to provide services and lodging for travelers
- the agriculturally developed Sonoyta Valley and town of Sonoyta south of the park in Sonora, Mexico
- El Pinacate Y el Gran Desierto de Altar (The Pinacate and Great Desert), a newly-established 302,000 hectare core and buffer areas (745,940 acres) a portion of the buffer area adjoins the southwestern boundary of the monument
- Cabeza Prieta National Wildlife Refuge, managed by the U.S. Fish and Wildlife Service, to the west, contains 860,000 acres consisting primarily of designated

wilderness, and shares airspace with the nearby Barry M. Goldwater Airforce Range

As a unit of the NPS, Organ Pipe Cactus NM is managed under the mandate of the 1916 Organic Act. This legislation established the National Park System and was enacted "to conserve the scenery and the natural and historic objects and wild life therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations." In addition to preserving the lands, the proclamation establishing Organ Pipe Cactus NM provided that the administration of the monument shall be subject to the following:

- the rights of the Tohono O'odham (formerly known as Papago) to pick the fruits of the organ pipe cactus, and other cacti, subject to regulations prescribed by the park;
- Presidential Proclamation of May 27, 1907 reserving a 60 foot wide strip of land running parallel to the international boundary for patrol and protection purposes (see Appendix A);
- Executive Order No. 5462 of 1930 establishing a 8.18-acre Customs and Immigration Reserve for use by Customs and Immigration (see Appendix A); and
- Executive Order of November 21, 1923, reserving a 40 acre tract as a public water reserve (see Appendix A).

A Master Plan was prepared for the monument in 1964 and has been used to guide management of the park since that time. Many of the management programs and infrastructure proposed in this plan have been implemented.

### PURPOSE AND NEED FOR THE PLAN

Several important changes have occurred since the preparation of this 1964 Master Plan that significantly affect management of the park. In 1976, the park was designated a United States Biosphere Reserve as part of the UNESCO Man and the Biosphere Program. This designation distinguishes the park as an outstanding, internationally significant ecosystem.

### *Purpose and Need for a Plan*

Increasing attention to the park's resources from internationally and nationally recognized scientists and researchers provides further evidence of the accuracy of its Biosphere Reserve distinction. Another important change occurred when mineral exploration and development were eliminated in the park by the Act of September 28, 1976, Public Law 94-29 (see Appendix A). The ecosystem has thrived by the curtailment of this activity. In 1978, Public Law 95-625 determined more than 95% of the park to contain wilderness values and officially designated these lands as Organ Pipe Cactus Wilderness (see Appendix A).

Approximately 312,600 acres of the park are designated wilderness and an additional 1240 acres as potential wilderness. The removal of

cattle from grazing in this area in 1978 also contributed to the state of the wilderness and the wilderness values.

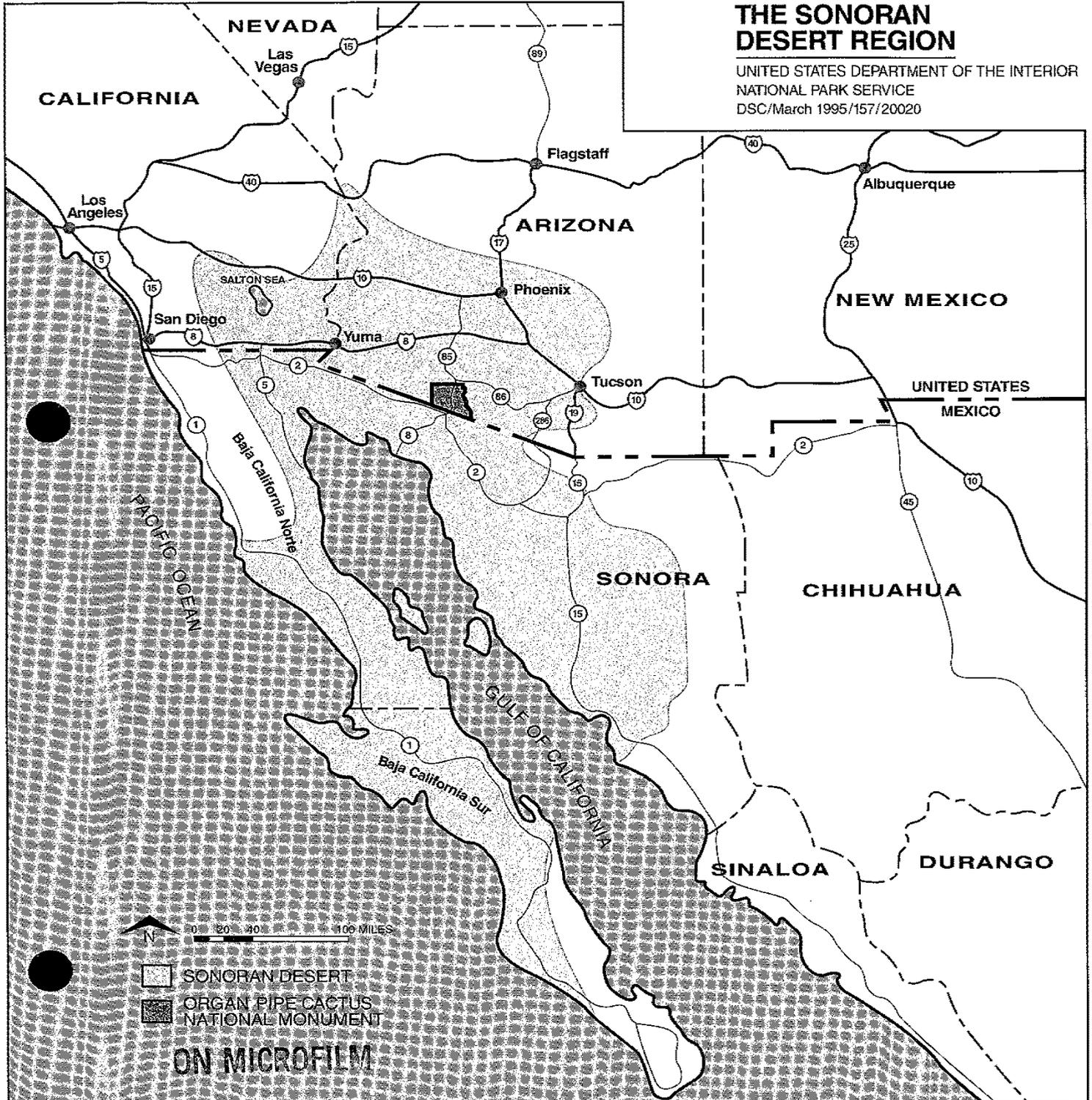
This increasing recognition of the park's unique global and regional significance has become the catalyst for a new planning effort. In conformance with the National Parks and Recreation Act, Public Law 95-625, this general management plan serves to guide development, but will also guide overall management and use in ways that will best serve visitors while preserving the values for which Organ Pipe Cactus NM was established.



# ORGAN PIPE CACTUS NATIONAL MONUMENT

## THE SONORAN DESERT REGION

UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE  
DSC/March 1995/157/20020



ON MICROFILM

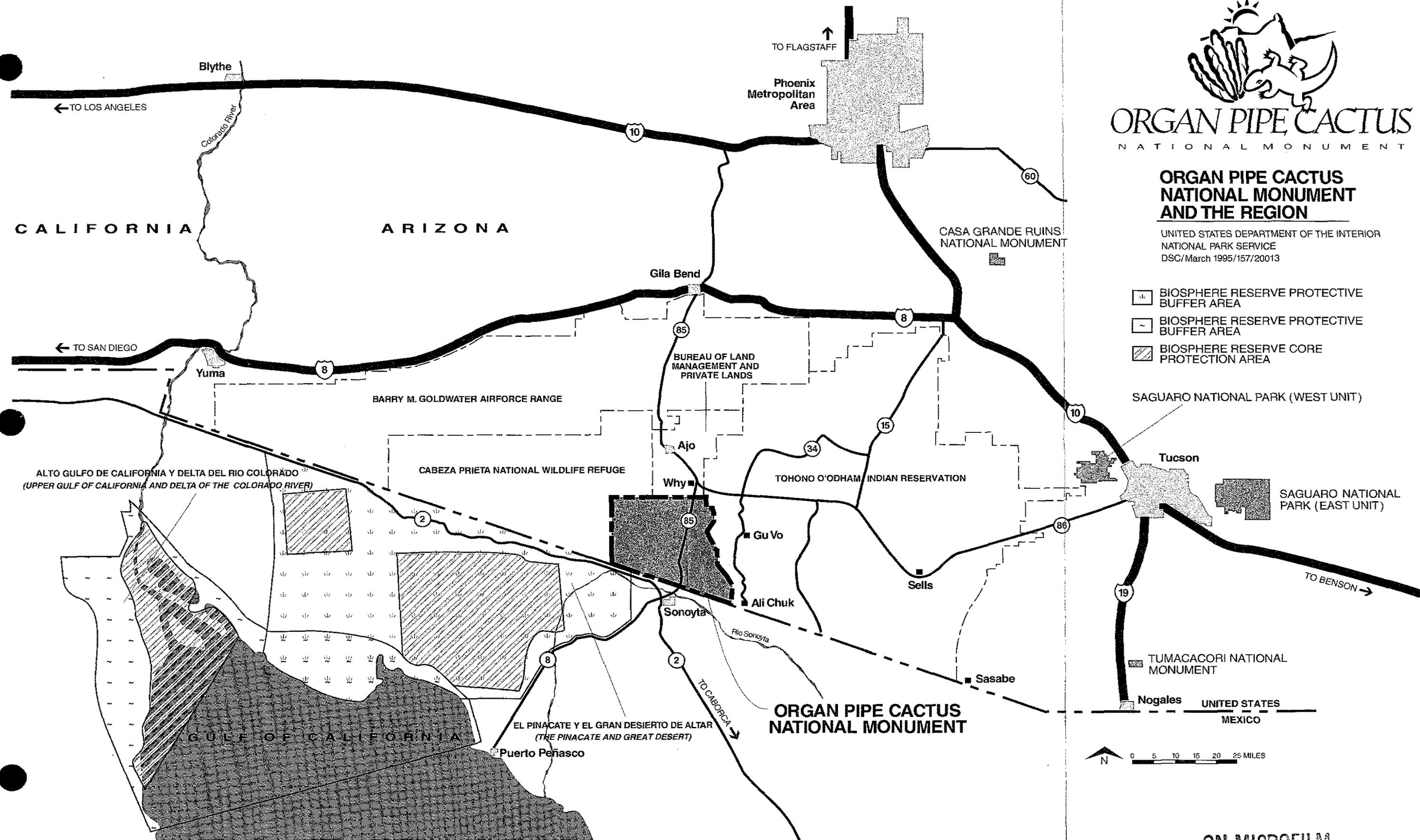


# ORGAN PIPE CACTUS NATIONAL MONUMENT

## ORGAN PIPE CACTUS NATIONAL MONUMENT AND THE REGION

UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE  
DSC/March 1995/157/20013

-  BIOSPHERE RESERVE PROTECTIVE BUFFER AREA
-  BIOSPHERE RESERVE PROTECTIVE BUFFER AREA
-  BIOSPHERE RESERVE CORE PROTECTION AREA



ON MICROFILM

## **DIRECTION FOR THE PLAN**

A series of statements defining the desired future of Organ Pipe Cactus NM were developed to guide management of the park including development of this general management plan. These were written by NPS planners and Park Staff to comply with the NPS's *statutory mandate to prepare a general management plan to guide management and development in the park over the course of the next 10 to 15 years.* The process used to develop these desired futures has resulted in the following:

- statements of the park's purpose,
- a description of the park's significance including its major attributes and distinctive position in the National Park System,
- a discussion of the issues and management concerns affecting the park, and
- the desired futures.

Expansion on each of these four elements follows. Together, these materials provide the fundamental basis and direction for this general management plan.

### **PURPOSE STATEMENTS FOR ORGAN PIPE CACTUS NATIONAL MONUMENT**

- Perpetuate for future generations a representative sample of the natural and cultural resources and processes of the Sonoran Desert and provide for public understanding, use, and enjoyment of same.
- Preserve for future use and enjoyment the character and values of designated wilderness within the monument.
- Serve as a natural outdoor laboratory for understanding and managing Sonoran Desert ecosystems.
- Serve as a baseline indicator against which *environmental changes can be identified.*

### **SIGNIFICANCE OF ORGAN PIPE CACTUS NATIONAL MONUMENT**

The following statements describe those aspects of the park that make it significant to the nation and to the world.

- Organ Pipe Cactus NM is a globally significant Sonoran Desert ecosystem that has been continuously researched for over 50 years and has been designated a Biosphere Reserve under the International Man and the Biosphere program.
- It is the most biologically diverse protected area in the Sonoran Desert occurring within the United States.
- Organ Pipe Cactus NM has a protected ecosystem providing habitat for a highly diverse flora and fauna, including threatened, endangered, and sensitive plant and animal species.
- People who visit Organ Pipe Cactus NM experience a protected natural area with wilderness character that provides opportunities for solitude and primitive recreation, enjoying the night time sky, and spiritual replenishment in a Sonoran Desert setting.
- There are expansive vistas of Sonoran Desert landscapes including such elements as dramatic mountains and valleys, eroding bajadas and alluvial fans, and magnificent specimens of columnar cacti.
- Organ Pipe Cactus NM is the site of *cultural resources that reflect long, widespread, and diverse occupations by American Indian, Mexican, and Anglo groups.*
- It is the site of the intersection of three cultures within the monument that is significant archeologically, geographically, and internationally.

## **PLANNING ISSUES AND CONCERNS**

The following issues and concerns were raised during public meetings and discussions with various public agencies, adjacent land owners, and other interested parties. The discussion also identifies activities occurring outside park boundaries that are affecting park resources and values. These issues and concerns are addressed in this general management plan.

### **Natural Resources**

The region as a whole is seeing a sharp growth in population placing heavy demands on scarce desert resources such as water and firewood, with similar impacts on wildlife populations and their habitats. One of the primary resource management concerns is the continued urbanization and agricultural development occurring along the international border.

Although a research data base exists, there is still a lack of basic data necessary to fully understand park resources and related threats.

Issues relating to water resources include alteration of natural flow regions and groundwater levels, degradation of park water quality, floodplain management and wetlands protection, water rights and related issues such as accelerated erosion.

Other pressing concerns include adequate protection of threatened, endangered, and rare plant and animal species and communities, air quality management, evaluation of visitor use impacts, monitoring of ecosystem health, control of trespass livestock, and revegetation of impacted sites.

The questions raised by these issues include:

- What can be done about herbicide and pesticide drift, invasion of non-native plant and animal species, and most significantly, groundwater depletion?
- How will an alternative be found to continued or increased pumping for agriculture in the La Abra Plain, which may lower the groundwater table and reduce the hydrostatic pressure at certain locations, such as Quitobaquito Springs, home to the only known habitat for the endangered Quitobaquito desert pupfish?

## **Cultural Resources and Relationships**

The park contains a rich array of cultural resources which include historic, archeological, and ethnographic resources. While surveys of these resources have been collected, there is a lack of basic data necessary to fully understand the resources and related threats.

Issues in this area include:

- How should these varied cultural resources be preserved?
- To what extent should visitor use be encouraged while providing adequate protection for these resources?
- Quitobaquito Springs area has cultural resource significance as well as natural resource significance. Cultural landscape remnants such as orchards, a dam, and building footprints are scattered throughout the area. The area is also rich in archeological resources. How should these resources be managed in order to protect the variety of resources and still accommodate visitor use?
- More needs to be known about the prehistoric Hohokam culture and possible Hohokam antecedents of the Tohono O'odham people and culture. Some sites are so sacred that information should not be shared with outsiders, yet, there is a critical need to interpret the cultural heritage of these people to park visitors. What opportunities exist to build better relationships, establish linkages, and share knowledge between the park and the Tohono O'odham Nation and the Hia-Ced O'odham (formerly Sand Papago)?
- There are concerns about the disposition of artifacts recovered from archeological context, and archeological sites potentially disturb resources which are valuable to the surrounding American Indian populations. How will this be managed?
- Archeological, ethnohistorical, and historical research is needed to understand and interpret Mexican involvement in the area. What opportunities exist to educate all area residents and visitors on the value and need to protect the cultural and natural resources in the park?

## **Visitor Use and Interpretation**

Many of the existing facilities and programs are not easily accessible and can be crowded. In addition, few employees make up the current interpretive staff. These limitations are in sharp contrast to the increase in visitation the park continues to experience. Population in the Sun Belt States, including Arizona, has skyrocketed in the last decade from both residents and retired "snowbirds". During the winter, this latter segment visits parks in the Sun Belt region, especially desert parks, including Organ Pipe Cactus NM.

In addition, the issues to be addressed include:

- **Burglary, theft, and vandalism** occur randomly throughout the park and regularly during certain times of the year at the Quitobaquito Springs area. Although signs have been posted to warn visitors, this threat of criminal activity greatly affects the quality of visitor experience in this special area. What can be done to alleviate this situation?
- **Above ground powerlines and night-time lighting** impact wilderness values and visual resources. Most of the existing development in the park is not consistent with southwestern architectural styles, nor is it sustainable. Barry M. Goldwater Airforce Range lies north and west of the park and shares air space with the Cabeza Prieta National Wildlife Refuge. In recent years, low level flights over Organ Pipe Cactus NM have increased. This activity can disrupt visitors and employees, impact wilderness values, and may impact wildlife. What opportunities exist to preserve wilderness values and the visual character of the park?
- **Centrally located in the Sonoran Desert region**, the name of the monument does not adequately reflect the importance of and variety of the resources that are protected. How can we change that?

## **Operations**

**Staffing and Facilities.** Even with recent staffing increases, there are insufficient numbers of employees to adequately preserve park resources and manage park facilities and increased visitor use. There is a particular lack of employees in the interpretation and cultural

resources divisions. There is a severe shortage of work space and a lack of housing for the existing employees. In some divisions, staffing levels have increased dramatically in recent years and are expected to continue to rise. To supplement its staff, the park continues to rely heavily on the use of volunteers and on visiting or associated researchers and scientists. Even with the staffing increases, there are insufficient numbers of employees to adequately preserve park resources and manage park facilities and increased visitor use. Some divisions, such as interpretation, administration, and cultural resources, have few if any employees.

Issues associated with this topic include:

- What development and facility needs are appropriate to provide sufficient work and housing space for park staff, volunteers and visiting scientists?
- Where should these facilities be located?
- What security measures are needed to protect employees and facilities?

A Development Concept Plan (DCP) for the Lukeville area was prepared and approved in 1978. Approximately 115 acres of land in the Lukeville area have been donated to the NPS since the document was approved. Due to recent land transactions and other issues, several goals of the 1978 DCP are now obsolete.

**Transportation.** Both recreational and commercial traffic in the region is expected to increase substantially as a result of tourism and NAFTA. Increases have been documented in the volume and size of commercial traffic, buses, and recreational vehicles (RVs) traveling through the park on State Route 85. Noise, light, and air pollution generated by this traffic already threaten wilderness values in the park.

Questions which need to be addressed include:

- What can be done to reduce existing as well as potential future impacts created by the volume and type of traffic on State Route 85?
- What measures could be implemented to improve conditions for wildlife, vegetation, and the visitor experience?
- What measures could be implemented to reduce the amount of light pollution generated by traffic within and outside of the park?

## *Purpose and Need for a Plan*

- The existing road network in the Twin Peaks area is confusing for visitors. What can be done to improve visitor transportation routes and to direct visitors away from administrative roads?

**External Management Issues.** While the park has been designated a biosphere reserve there seems to be a lack of commitment and awareness regarding this program in the United States. In places, the common boundary between the park and the Tohono O'odham Nation does not follow the natural divide along the crest of the Sierra de Santa Rosa. This sets the stage for conflicting land uses between these areas and ineffective administration.

Issues within this topic include:

- What opportunities exist to establish cooperative efforts and partnerships with others in the Sonoran Desert?
- What are the common needs and goals of the federal land managing agencies that border the park, each with a different agency mission to uphold?

Recent developments in international politics and social trends are changing the way the region will be managed. Recreation and tourism are being looked to as potential economic replacements for the loss of large-scale mining and the collapse of the Gulf of California shrimp industry. Ratification of NAFTA has sent in motion a number of economic schemes along the border, many of which could affect Organ Pipe Cactus NM. Several issues that affect the park are common to other places that lie along the international border with Mexico; resource depletion, poor environmental standards and compliance, illegal drug traffic, illegal immigrant traffic, burglary, theft, and vandalism occur regularly in the park together with resource depletion and effects of population increases.

- How can people, facilities, and property be secured in the park?
- Mexico has recently established two protected areas in its northern tier of states. Do opportunities exist to work with the Mexican government and its citizenry to understand issues and build common ground regarding resource concerns, border populations, and other issues while recognizing the cultural and language distinctions?

## **DESIRED FUTURES**

The desired futures that follow set the framework for the two alternative management strategies that were developed for this general management plan. The futures are based on the park's purpose and significance and focus on the park's wilderness values and on the Biosphere Reserve program.

### **Park Futures**

#### *Natural Resources:*

- Establish and maintain baseline data on the condition of Sonoran Desert ecosystems.
- Achieve sufficient understanding of Sonoran Desert ecosystems for effective protection.
- Restore and preserve intact a significant and representative portion of Sonoran Desert ecosystems.
- Increase the land area that qualifies for wilderness.

#### *Cultural Resources:*

- Recognize the significance of the full continuum of cultural resources in the context of natural resources.
- Achieve sufficient understanding of the park's cultural resources for effective protection.

#### *Visitor Experience:*

- Increase public understanding and appreciation of arid environments.
- Develop recreational opportunities that allow visitors to experience the monument without impairing its natural, cultural, or scenic values.
- Preserve the harmonious natural setting that allows opportunities for solitude and spiritual refreshment.
- Create secure, crime-free conditions for visitors and employees.

#### *Cooperative Management:*

- Achieve cooperation in regional land use and management among surrounding monument neighbors that supports protection of monument values.
- Implement a coordinated Man and the Biosphere program with surrounding land managers and agencies.

**Man and the Biosphere Program**

*Management Theme.* The NPS would participate in facilitating a voluntary and cooperative effort with neighboring land managers to preserve, study, and wisely use the natural and cultural resources within an expanded Sonoran Desert Biosphere Region.

*Resources Management.* The NPS would work toward balanced, zoned management of natural and cultural resources across the international and other borders through voluntary cooperation and the sharing of knowledge,

expertise and personnel among Sonoran Desert land-managing entities.

*Visitor Experience.* The visitor would have a wide range of opportunities for self-directed experiences related to natural and cultural resources. The Sonoran Desert would in effect constitute an expanded biosphere reserve, and visitors would be exposed to multicultural and international information that would be global in perspective and emphasize human / environmental concepts and concerns.

THE PROPOSAL AND  
ALTERNATIVE



## INTRODUCTION

This draft general management plan contains two alternatives for management of Organ Pipe Cactus NM. These two alternative "futures" for the park were developed based on the purpose, significance, issues, and desired future statements.

### **"Alternative 1: The Preferred Future"**

constitutes the NPS proposed course of action and is the minimum requirements alternative. This alternative also represents the minimum actions and developments needed to make the park operational in a way that provides for primary visitor use, park management, resource protection, and enhanced natural and cultural resources management capabilities.

### **"Alternative 2: A Continuation of Existing Conditions"**

constitutes the NPS no action alternative. This alternative is based primarily on continuing the course of action as described in the 1987 and 1994 Statement for Management, the 1994 Natural and Cultural Resource Management Plan, and other approved documents that have been guiding ongoing park management and development.

The alternatives present essentially different management strategies for the park. However, some actions are so similar in intent or are so universally needed that they are proposed in both alternatives. The actions common to both alternatives are described under the corresponding topics and in the summary of alternatives found at the beginning of the document. In addition, a summary of the potential consequences of implementing these alternatives follows the alternatives summary.

Alternative 1 was selected as the proposed action because it:

- enhances the park's capabilities to fulfill NPS Management Policies, the Wilderness legislation, and Biosphere Reserve designation;
- identifies and makes provisions for the unique visitor experience based on the park's significance and wilderness values; and
- provides better direction for building international and cultural linkages and cooperative management strategies in the Sonoran Desert region.

### **ALTERNATIVES CONSIDERED BUT REJECTED**

Many alternatives were considered during generation of this plan which began in 1988. The workshop to identify the park's purpose, significance, and desired futures was not held until 1990. The results of this process ruled out some original ideas for alternatives that were clearly inconsistent with the park's purpose and significance. Desired futures together with the wilderness legislation narrowed the range of appropriate options to the two alternatives presented in this general management plan.

The following actions related to the possible expansion of the monument, relocation of State Route 85, headquarters, and other facilities, and change to the employee housing proposal, are described below and the reason for the rejection of each is discussed.

*Monument Expansion.* Early in the planning process, a proposal emerged to expand the monument to include the Cabeza Prieta National Wildlife Refuge. At the time, some people felt that these lands and resources would be afforded greater protection by incorporating them into the monument. Since the emergence of this idea, most of the land is now designated wilderness. The NPS decided the idea of adding this land to the monument was no longer valid or necessary since both Organ Pipe Cactus NM and the Cabeza Prieta National Wildlife Refuge are being managed for similar values.

*State Route 85 Relocation.* The NPS considered re-routing the traffic that is merely traveling through the park to the nearest potential through-route due to the significant impact the continually increasing volume of

## *The Proposal and Alternatives*

this type of traffic and the impact it has on the resources and wilderness values of Organ Pipe Cactus NM. Initially, it was determined that Route 34 through the Tohono O'odham Reservation, which connects State Route 86 with the settlement of Ali Chuk just north of the international border, was the nearest and therefore most likely candidate. Based on further assessment and discussion of the idea in light of its controversy, sensitivity, and the recent enactment of NAFTA, the NPS decided instead that a separate planning effort should occur in which all parties potentially affected by relocation became full participants and a full range of alternative routes were carefully developed and considered. The NPS still feels that re-routing commercial and other through traffic away from the monument is still in the best interest of the visitors and resources of Organ Pipe Cactus NM, but has rejected proposing a solution to this issue in this general management plan. The proposed planning effort is discussed under "Area Transportation Network" in *Alternative 1, The Proposed Action*.

### *Headquarters and Other Facility Relocation.*

An alternative was discussed to relocate administrative and other facilities to Ajo or other areas outside the park. This proposal was rejected because the NPS feels it is more efficient and economical to centralize operations near the resources and visitors that are being managed and protected. Removing a majority of employees and staff from the park would require a duplication of some services, increase travel time, make supervision more difficult, and generally increase costs. It was felt that this was not appropriate during a time in which the NPS is working to become more efficient with fewer financial resources.

*Housing in the Twin Peaks Area.* In 1994, the Government Auditing Office released a report on housing in the National Parks. In essence, the report states that the NPS should not provide housing in parks where NPS employees can obtain reasonably priced housing in existing communities within reasonable commuting distance. The report acknowledged the continued housing of some employees within park boundaries for emergency response, safety, and security reasons was necessary.

Before this report was released to the public, Alternative 1 contained a proposal to construct five new three-bedroom homes for permanent employees within the existing housing loop in the Twin Peaks area. Because Ajo is within a 45 minute drive and contains affordable housing, it was decided to eliminate the new homes from the proposed action. However, for safety and security reasons, the NPS would continue to house employees in existing single family residences and still plans to construct some additional housing for seasonal employees. These actions are described under the "Employee Housing" section in each alternative.

## ORGANIZATION OF THIS DOCUMENT

Actions are proposed and discussed for the following topics in each alternative:

Management emphasis for the lands in the park and the park's carrying capacity limits are discussed under **Land Use and Management**.

Strategies identifying the principal projects needed to protect, preserve, and perpetuate the natural and cultural resources of the park are discussed in **Resource Management**.

**Visitor Use and Associated Facilities** includes recommendations about issues relating to the desired visitor experience and on the activities, levels of use, and appropriate development to be undertaken in each case.

Facilities are proposed and staffing levels are discussed for effective administration of the park in **Park Operations and Associated Facilities**.

**Development Concept Plans** depict proposed changes to the location, capacity, and function of facilities in the Twin Peaks, Quitobaquito, and Lukeville areas of the park.

**Name Boundaries, and Wilderness Area Changes** describes modifications proposed for each of these topics.

**Plan Implementation and Costs** contains implementation strategies and the estimated total costs of implementing each alternative.

## ALTERNATIVE 1: The Preferred Future

Alternative 1 (the preferred alternative) proposes major actions to protect resources and to enhance the visitor experience at Organ Pipe Cactus NM. This alternative looks both inside and outside Organ Pipe Cactus NM boundaries to determine a management strategy for preservation and use that would be beneficial to the region as a whole: culturally, politically, and economically.

### LAND USE AND MANAGEMENT

A new management zone scheme is proposed for the park, and includes changes to carrying capacity limits currently set by the park. The 1978 General Authorities Act, Public Law 95-625, requires the identification and management commitment to establish visitor carrying capacities on all park lands. Carrying capacity refers to the type and level of visitor use that can be accommodated while sustaining desired resource and social conditions that are based on park purpose and significance. Organ Pipe Cactus NM has established visitor use capacities for all areas of the park.

Most of these current capacities would be retained since visitor use does not currently exceed these limits. However, the limits set for the Quitobaquito area would be changed, as described below, and the amount of overnight camping in the campgrounds would increase, as described in the Visitor Use and Facilities section. In the future, the park may re-examine some of the visitor use capacities as part of a wilderness management plan.

### Management Zones

The NPS uses a management zone system to indicate the management emphasis for specific lands within each unit of the National Park System. The management zones used for Organ Pipe Cactus NM are described below and depicted on the map of Alternative 1. These zones represent a modification of the existing zones in order to guide management in a manner consistent with the park's stated purpose and significance.

**Wilderness Zone** – The management emphasis in this zone is consistent with the legislative mandate. All lands in this zone would remain undeveloped, retaining the primeval character and influence for which they were designated. As stated in the legislation:

- lands would be preserved in their natural conditions affected primarily by the forces of nature,
- outstanding opportunities for solitude and primitive, unconfined recreation would be provided, and
- ecological, geological, and cultural features of scientific, educational, scenic, or historical value would be preserved.

Only those facilities that are the minimum necessary for the health and safety of wilderness travelers or for the protection of wilderness resources would be provided. Approximately 312,600 acres—about 95 % of the park—are currently designated wilderness.

The following three subzones were created to focus on unique situations that occur within the wilderness zone:

**Potential Wilderness** – Potentially designated wilderness lands would be managed in a manner consistent with the wilderness zone even though, at this time, these lands contain elements inconsistent with wilderness values. When several actions proposed by this plan are implemented, approximately 1600 acres would be eligible for designation. This figure includes the 1240 acres that are currently designated as potential wilderness additions included in the legislation establishing wilderness in the park. These lands are described under the Name, Boundaries, and Wilderness Area Changes section of this plan. Once they are officially designated wilderness, the lands would become part of the wilderness zone.

**Quitobaquito Management Area** – Quitobaquito would be managed consistently with its varied

## *The Proposal and Alternatives*

significance and wilderness designation. Due to a freshwater spring, this approximately 42 acre area has long been a crossroads of human activity as well as a center of biological change and diversity. Quitobaquito is formally declared eligible for listing on the National Register, is culturally important to the Hia-Ced O'odham and Tohono O'odham, is federally designated critical habitat for the Quitobaquito desert pupfish, and is one of the most popular visitor destinations in the park. Management emphasis for this unique blend of resources would include:

- maintaining the ecosystem and preserving the critical habitat using only those manipulations essential to its continued functioning
- preserving the cultural resources, and
- providing for safe public access and enjoyment of significant cultural and natural values within the context of the above items.

The carrying capacity for this area would be changed in order to successfully preserve the sensitive resources and accommodate visitor use in this area. The park would determine this capacity as part of the new trail network discussed in the Development Concept Plans section.

**Non-Wilderness Zone** – Approximately 18,090 acres, or 5% of the park are not designated as wilderness because of existing developments or uses that are incompatible with wilderness values. Lands in this zone would be managed under the following subzones:

**Travel Corridor** – These lands would remain relatively undeveloped and would be managed as travel corridors to provide visitor and management access to the designated wilderness. This zone contains 14,626 acres of non-wilderness land including Ajo Mountain Drive, Puerto

Blanco Drive, Bates Well Road, Camino de dos Republicas, Alamo Canyon Road, Senita Basin Road, Growler Valley Road, Armenta Road, and the powerline corridor that runs parallel to and west of State Route 85.

**Development Area** – Management emphasis in the Development Area would focus on the needs of visitors and of park management. This zone applies to non-wilderness areas where concentrations of facilities and use substantially alters the natural environment. Visitor and management support facilities in the Twin Peaks area, the Lukeville area, and the State Route 85 corridor are included in this zone which totals approximately 3464 acres.

**Cultural Zone** – Lands in the Cultural Zone would be managed to emphasize the preservation, protection, and interpretation of archeological, ethnographic, and historical resources and their settings. Where these zones occur in wilderness, they would be managed in a manner consistent with this designation. Areas in the Cultural Zone include the eight properties currently listed in the National Register of Historic Places, one property formally determined eligible for listing, and other culturally significant resources that would receive general visitation. This zone would also include significant, sacred, and other traditional-use sites in the park of the Hia-Ced O'odham and Tohono O'odham based on consultation with them regarding the significance, treatment, and possible visitor use of these sites. It is important to note that this zone does not include all significant cultural resources in the park. Sensitive sites or features that can not withstand use would not be included in this zone and consequently, are not shown on the Alternative 1 map; these important resources would still be protected under Federal law, NPS management policies, and the Wilderness legislation. The total acres of lands in the Cultural Zone are reflected in the Wilderness and Non-Wilderness Zone totals.



# SONORAN DESERT NATIONAL PARK

## ALTERNATIVE 1: *The Preferred Future*

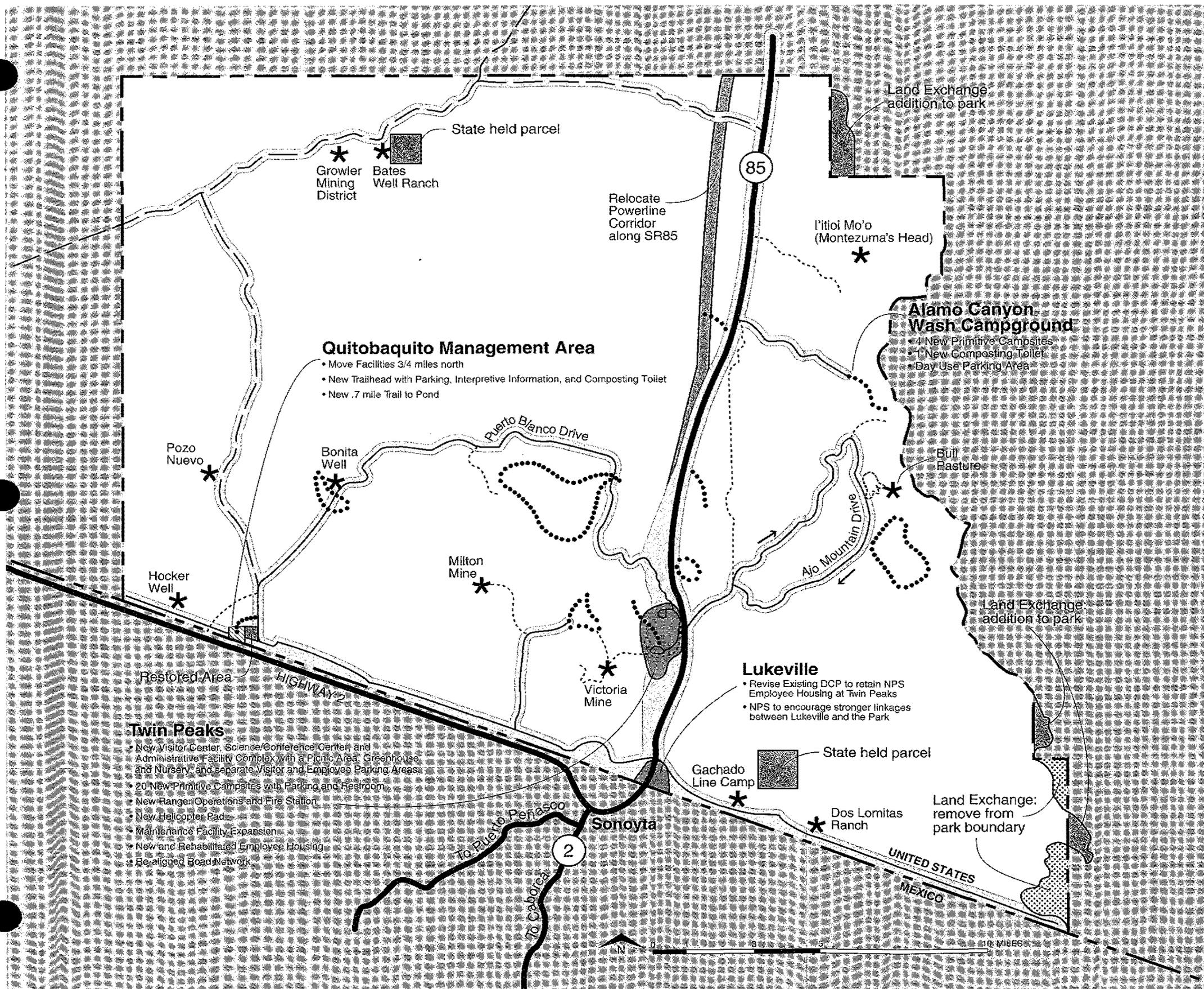
SONORAN DESERT NATIONAL PARK  
UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE  
DSC/March 1995/157/20014

### MANAGEMENT ZONES

- Non-Wilderness Development Area
- Quitobaquito Management Area
- Non-Wilderness Travel Corridor
- Wilderness Zone
- Potential Wilderness Additions
- Cultural Zone

### GENERAL LEGEND

- Existing Trails
- Proposed Maintained Trails
- Paved Roads
- Graded Dirt Road
- Unimproved Dirt Road



ON MICROFILM

## **RESOURCE MANAGEMENT**

### **Natural and Cultural Resource Management Plan**

A comprehensive Natural and Cultural Resource Management Plan (NCRMP) has recently been completed by the park staff and other professionals and will continue to guide management of the park's natural and cultural resources. The NCRMP identifies management strategies, project statements, and priorities that clearly reflect issues and ideas identified during development of this general management plan. Because of this, the NCRMP:

- presents a comprehensive and integrated resources management program that deals with the interactions among geologic, biologic, historic, and cultural variables,
- is pro-active in addressing the need for baseline data, and
- effectively deals with both internal and external issues relating to ecosystems, biodiversity, inventory and monitoring, and degradation of cultural, natural, and wilderness resource values.

It is important to mention that the NCRMP deals primarily with research, inventory and monitoring, and data collection, all of which the park can implement without further compliance with the National Environmental Policy Act (NEPA) of 1969. The park would complete the appropriate NEPA compliance (including section 106) before implementing any of the project statements.

This alternative proposes the following actions related to natural and cultural resource management activities which are not currently identified in the NCRMP.

### **Science and Resources Management Center**

A new science and resources management center (SRMC) as well as a new greenhouse and nursery would be built to satisfy the specific requirements and functions of the Resources Management Division and its expanding research and resources management program. The purpose and significance statements clearly point out the park's critical role in preserving, understanding, and managing the cultural and natural facets of the Sonoran Desert ecosystem. The SRMC,

greenhouse, and plant nursery would become internationally recognized facilities where this role could be carried out effectively. The facilities would serve to:

- concentrate natural and cultural resource management and resource functions at one new location in the Twin Peaks area near the visitor center,
- provide a forum and working space for the science and research community associated with the Sonoran Desert ecosystem, and the park's resource management activities that work to preserve it.

The location and layout of these facilities are described in the Twin Peaks Development Concept Plan (DCP) presented later in this alternative. The SRMC would contain approximately 8,000 square feet and would include the following functions: visitor reception and exhibit area, approximately 11 offices for resource management, cultural resources, and curatorial staff, a large conference room, labs, restrooms and shower, kitchen and eating area, museum storage and archival space, a library, and various work rooms, including a dark room, and space for circulation, janitorial and mechanical/electrical equipment.

A new greenhouse approximately 1,200 square feet in size and a nursery approximately 3,000 square feet in size would also be developed as a part of the SRMC. As with the existing operation, the new facilities would be used for on-going and recurring revegetation projects and as a demonstration facility, and would comply with the Western Region Directive and 1993 Guidelines for Revegetation in Disturbed Areas (WR-094, 1993). The value of these facilities, the greenhouse, nursery, and SRMC, goes beyond their contribution to science, resources management, and revegetation in the park and in the region. There is also a strong interpretive value for the public. These facilities would become an integral component of the interpretation program as described in the Interpretation section under Visitor Use and Associated facilities.

With the exception of the division chief, all resource management personnel currently share office space in two former residences in the Twin Peaks housing complex. Because these

## *The Proposal and Alternatives*

structures were originally built for another purpose and had to be creatively adapted for their new role, they do not function optimally in meeting the division's needs for office, meeting, storage, and laboratory space. When the new facility is constructed, the houses that now serve as the resource centers would be converted back to employee residences.

### **Cultural Resource Preservation**

In addition to strategies proposed in various sections of the NCRMP, this alternative proposes preservation treatments for and use of significant cultural resources in the park. Consultation with neighboring American Indians would be an integral part of this program and is discussed as a separate topic. All new park developments would be surveyed for possible archeological resources and if needed, mitigation measures, such as avoidance or data recovery, would be implemented to protect those resources. The NCRMP calls for many actions that would increase significantly the park's knowledge and understanding of known and currently unknown cultural resources and properties. It is important to continue to evaluate these archeological, ethnographic, and historic resources, including possible traditional cultural properties, for potential eligibility for listing in the National Register of Historic Places.

Table 1 follows listing and proposing preservation treatment and use of:

- properties listed in or eligible for listing in the National Register of Historic Places, and
- places important to understanding the special features, traditions, and use patterns specifically relating to the history and human use of the park that are potentially eligible for listing in the National Register.

The significance of these properties is discussed in the affected environments section of this document.

Based on the *Secretary of the Interior's Standards for Rehabilitation* and the NPS, *Cultural Resource Management Guideline, Release Number 4* (NPS-28, 1994), preservation treatments would be utilized depending upon the completeness and variety of the historic fabric and the potential for

interpreting what happened in history. Preservation means that the historic character of a property would be retained and the historic fabric repaired and stabilized as needed. Preservation does not mean that historic structures would be restored, but instead means that these structures would be repaired with matching or similar materials for historical accuracy. In cooperation with natural resource programs, the use of scarce native materials, such as saguaro and organ pipe cactus ribs, for repair and stabilization work would be prohibited.

There are many other potentially significant cultural resources in Organ Pipe Cactus NM including prehistoric and historic archeological resources, water resources, and those related to transportation, mining, and ranching. Not enough information is available at this time regarding the existing condition and significance of these resources to prescribe appropriate treatments, so they have not been included in Table 1. The NCRMP calls for hiring a cultural resources specialist to direct the cultural resources management program including baseline studies and surveys of cultural resources. Treatments for these resources would be based on the results of these studies and prescribed in updates of the NCRMP.

In addition to these preservation treatments, studies and management strategies not currently identified in the NCRMP are proposed in the table for certain cultural resources.

### **Native American Consultations**

Consultation with American Indian and other Native Americans is required by the Historic Preservation Act of 1966. The ongoing effort of American Indian consultations would be strengthened to learn more about possible sacred and other traditional-use sites within the park and to encourage cooperation and involvement of local American Indian groups in park management. The park would work with the neighboring Tohono O'odham and Hia-Ced O'odham groups of the Tohono O'odham Nation to develop a memorandum of understanding to identify and to protect important cultural sites in the park, including traditional cultural properties. The memorandum would cover procedures to determine when the park would

Table 1. Cultural Resource Treatments for Significant Properties

<i>Properties</i>	<i>Treatment</i>	<i>Use</i>
<b>National Register Properties (listed and eligible for listing)</b>		
Bates Well Ranch	Preservation of structures and site	Self-discovery site for interpretation on backcountry road; signs for interpretation and education about protecting resources
Bull Pasture	Preservation of historic scene	Self-discovery site for interpretation on designated trail; combined sign for interpretation and education about protecting resources
Dos Lomitas Ranch	Preservation of structures and site	Self-discovery site for interpretation on designated dirt road along international border; signs for interpretation and education about protecting resources
Gachado Well and Line Camp	Preservation of structures and site	Self-discovery site for interpretation on designated dirt road along international border; signs for interpretation and education about protecting resources
Growler Mine and Mining District	Preservation of historic scene	Self-discovery site for interpretation on backcountry road; brochure for interpretation and education about protecting resources
I'toi Mo'o (Montezuma's Head)	Preservation of traditional cultural property	Use and interpretation to be decided in consultation with the Tohono O'odham and Hia-Ced O'odham
Milton Mine	Preservation of structures and site	Self-discovery site for interpretation via cross-country wilderness hiking; brochure for interpretation, education about resource protection, and visitor safety; maintain safety barriers over mine shafts and adits
Quitobaquito Springs	Preservation of historic scene; preparation of cultural landscape inventory and management plan	Self-discovery site for interpretation on newly designed trail system along international border; signs for interpretation and education about protecting resources
Victoria Mine	Preservation of structures and site	Self-discovery site for interpretation on designated trail; signs for interpretation and education about resource protection and visitor safety; maintenance of safety barriers over mine shafts and adits
<b>Potential National Register Properties</b>		
Historic Water Resources	Preservation of historic scene and evaluation under National Register criteria	Generally remote self-discovery sites for interpretation, not on designated trails; brochure for interpretation and resource protection
Wall's Well-Bates Well Road	Preservation of historic route and evaluation under National Register criteria	Self-discovery site for interpretation on designated dirt road; brochure for interpretation and education about protecting resources
International Boundary Markers	Preservation of historic objects and historic scene; evaluation under National Register criteria	Generally remote self-discovery sites for interpretation, not on a designated trail; brochure for interpretation and resource protection
El Camino del Diablo	Identification and preservation of historic route and evaluation under National Register criteria	Self-discovery site for interpretation, not on a designated trail; brochure for interpretation and resource protection
Ranching Line Camps	Preservation of historic scene and evaluation under National Register criteria	Self-discovery sites for interpretation, some on designated trails/dirt roads and some not; brochure for interpretation and resource protection

## *The Proposal and Alternatives*

share information on the management of natural and cultural resources, consult on possible finds of human remains and prehistoric and historic artifacts, and discuss appropriate treatments and interpretation of significant resources. As a result of this ethnographic work, more could be learned and documented about sacred and other traditional-use sites of past and contemporary importance to the park's American Indian neighbors.

### **Visual Resource Preservation**

The landscape character of the pristine, primeval, Sonoran Desert landscape is an essential value the park is legislatively mandated to preserve. Two actions are proposed to help preserve these visual resources: relocating and placing powerlines underground and implementing design guidelines.

**Underground Powerlines.** This plan proposes that all powerlines inside the monument be placed underground at their next scheduled replacement cycle. This would include the 27-mile stretch of powerline between the north boundary of the park and Lukeville along State Route 85. The visual impact of the above ground powerlines and the cyclic maintenance they require compromise wilderness values. Consequently, these corridors were not designated wilderness in the 1978 legislation. Relocating the powerlines to non-wilderness areas, then restoring these lands to natural conditions would make approximately 206 acres eligible for wilderness designation and would reduce impacts on the park's visual resources.

The Arizona Public Service Company leases land from the NPS, maintains the powerlines within park boundaries, and would be responsible for the cost of replacing the existing aboveground powerlines. The NPS would work with the Arizona Public Service Company to schedule replacement of powerlines in the park.

**Sustainable Design Guidelines.** Prior to design of new facilities, sustainable design practices would be applied to minimize the impact of new developments on the landscape and on natural systems. Sustainable design is the philosophy that human development should exemplify the principles of conservation, and encourage the application of those principles in our daily lives. All decisions—from initial concept through design, construction, and operations—must be evaluated against principles of natural and cultural resource conservation. Future development in Organ Pipe Cactus NM must work to:

- maintain the biological diversity and environmental integrity of the park;
- contribute to the health of the park's air, water, and soils;
- incorporate landscape and facility design and construction methods that reflect bio-regional goals and conditions; and
- reduce the impacts of human use.

The following general guidelines would begin to direct all new development in the park. In the future, the park would develop these guidelines in greater detail.

1. The NPS has recently published a book titled "Guiding Principles of Sustainable Design" (September 1993). The principles and practices presented in this book would be used to guide development of facilities in the park.
2. The visual character of development in the park would replicate southwestern architectural styles and designs including indigenous themes that blend into the landscape. Scale, materials, color, texture, continuity, furniture, and other issues related to the built environment need to be addressed as they relate to the Sonoran Desert experience.
3. Facilities would be designed to be accessible by employees and visitors with disabilities.

4. A landscape plan using native plants would be developed for existing and any newly developed areas within the park.

5. To the maximum extent possible, park developments would not be readily evident from State Route 85. Native colors, non-reflective materials, and plant materials would be used to accomplish this task.

6. The more restrictive lighting requirements under the Pima County Outdoor Lighting Code would be applied throughout the park to conserve energy and to preserve the values of the nighttime sky in the designated wilderness.

7. Park roads would be maintained to blend into the natural setting and would only be paved if necessary for safety, maintenance, or resource considerations.

## **VISITOR USE AND ASSOCIATED FACILITIES**

Visitors come to Organ Pipe Cactus NM to experience the peace, beauty, climate, open space, and solitude of the Sonoran Desert wilderness. There are an array of opportunities including hiking, camping, wildlife watching, driving, photography, and general exploration. But it is the desert landscape setting for these activities that make the visitor experience so special.

Programs and facilities regarding interpretation, camping, and the area transportation network are proposed to provide visitors with essential opportunities to experience the special values of Organ Pipe Cactus NM. The strategies, programs, activities, and appropriate developments for each of these areas are described below. These proposals serve to enhance the visitor experience of the park by:

- instilling a sense of appreciation and support for biological, spiritual, and cultural values inherent in our world;

- allowing people to more easily identify with their heritage and its contribution to their being;
- enabling visitors to experience nature and natural processes first hand; and
- increasing recognition that preservation of the park's many natural and cultural resources is important to our quality of life.

## **Interpretation**

Interpretation is a process of education designed to convey information to the visiting public, to stimulate curiosity, and to promote understanding and appreciation of the park's significance. To accomplish interpretation in a park, themes, stories, media, services, and facilities are determined and detailed in a document referred to as an interpretive prospectus (IP). The IP for Organ Pipe Cactus NM was prepared during this planning effort. The actions proposed in the IP are summarized below.

The following objectives for the interpretation program were developed:

- Provide an interpretation program that is comprehensive in its scope of subject matter concerning park resources and their management.
- Increase environmental awareness and appreciation of deserts. Focus on an ecosystem approach.
- Maintain both in-park and outreach elements in the interpretation program.
- Integrate the human and natural history stories to ensure that biosphere goals are achieved. Interpret cultural resources in the context of natural resources.
- Provide adequate information to allow visitors to choose their desired park experience. Varying time budgets and seasonal differences must be accommodated.
- Incorporate the results of the research program.
- Promote programs which result in a larger area of cooperation around the monument.

## *The Proposal and Alternatives*

- Provide facilities and services appropriate to the visitation levels and patterns as well as to the interpretive material to be presented.
- Promote safe visits.

**Interpretation Theme Outline.** With the above objectives in mind, and in recognition of the park's expanded interpretive role as a Biosphere Reserve, the park staff and planning team developed the following theme outline for interpretation at the park. The theme outline captures the essence of the stories associated with a particular place. These themes are further refined in the IP, and include locations for presentation of each message.

I. Organ Pipe Cactus NM is a land of amazing richness and diversity. The monument is special because of its combination of plants, animals, and landforms.

The Sonoran Desert is the most lush and biologically diverse of all the North American deserts.

Because of the monument's location and environment, it contains a unique assemblage of plants and animals, including some species of plants and animals that reach their range limits in the park.

Organ Pipe Cactus NM is important for the protection/survival of some unique and/or endangered species.

II. Cultures have successfully lived and thrived in this desert environment from prehistoric times to the present. Like the abundant and diverse natural resources, the cultural history of Organ Pipe Cactus NM is rich in diversity.

Organ Pipe Cactus NM is an area of confluence of three prehistoric peoples. Peoples from prehistoric to recent times have found similar and yet different ways of living with the desert.

The desert environment shaped the experience of all peoples who have occupied Organ Pipe Cactus NM. Yet at the same time, these peoples shaped the land in ways that met their needs.

III. Environmental factors, including climate, latitude, altitude, water and landforms, determine the flora and fauna, which in turn have influenced how humans have lived here over time.

The region's geologic history forms the substrate of Sonoran Desert ecology.

The presence of water determines the morphology, distribution, relative abundance and density of plants and animals, and also human living patterns, distributions, trails, and transportation routes.

IV. Organ Pipe Cactus NM, as a protected part of the Sonoran Desert, is a unique living laboratory in which environmental changes occurring within the Sonoran Desert are being monitored.

Humankind, as an integral part of the world around us, must become fully aware of our impacts upon the environment and conscientiously responsible for our stewardship.

Organ Pipe Cactus NM is a "treasure house" of natural and cultural history which can focus the importance of human interaction with the environment.

The lessons we learn of human and natural changes in Organ Pipe Cactus NM may offer keys to human survival on Earth.

V. Organ Pipe Cactus NM's natural resources are dependent on delicate balances and environmental conditions that must be maintained through responsible management.

Organ Pipe Cactus NM's natural resources know no political boundaries and require cooperative management among three nations and many agencies to effectively preserve and manage them. The Man and the Biosphere program facilitates cooperative management for the valuable resources under our care.

**Interpretive Facilities and Programs.** Some new and some improved facilities and programs are proposed in order to meet the interpretation objectives and present the themes and stories identified as important to understanding the park's purpose and significance. The new visitor center, new science and resources management center, and rehabilitated campground amphitheater are all part of the Twin Peaks area and are further described in the Twin Peaks DCP, presented later in this alternative.

*New Visitor Center.* A new visitor center building would be constructed to accommodate needed orientation and interpretation programs and media. The existing visitor center building would be renovated for administrative functions. In this way, administrative and public use functions could be separated. Based on needs identified in the IP, the new visitor center would contain approximately 6000 square feet of interpretive and public use spaces in addition to rest rooms. The following functions would be included in the visitor center:

- lobby/reception/circulation area with information desk and orientation media
- sales area for publications and related material
- interpretive exhibit area
- patio for outside programs and for quiet breaks
- multi-use theater
- public rest rooms
- first aid station
- office space for six full time employees
- office and work space for four seasonal employees
- employee lunch/break room
- employee rest room
- storage spaces for sale items, janitorial supplies
- space for circulation and mechanical/electrical

New programs would be added to accommodate disabled, visually impaired, hearing impaired, and non-English speaking visitors. A relatively short interpreted trail, accessible to visitors with disabilities, would also be constructed. Similar to the existing trail, the new trail would need to include a variety of desert plant habitats and should be located to avoid intrusions by roads and other developments and activities.

*Science and Resources Management Center.* Interpretive and public use functions would be included in this new facility described previously in the Resource Management section. A lobby and reception area is called for, with exhibits featuring current park research projects. Public access into scientific labs and offices would be restricted.

A viewing area would be incorporated into the nursery so that visitors could see the extent of the facility without wandering freely through the plantings. Some exhibitry would be provided to interpret the revegetation program, methods of propagating desert plants, and the importance of gene pools in biological diversity.

Visitors would be encouraged to visit the nursery and greenhouse. A multi-purpose room has been proposed for scientific and administrative purposes. The IP recommends designing this facility to also accommodate use by visitor and public groups such as special educational groups, interpretive workshops, seminars, and research presentations.

*Campground Amphitheater.* The existing 350-seat amphitheater would be totally rehabilitated. Both its size and its location, above the mapped flood zone, would be retained. The screen, stage, audio-visual booth, sound system, lighting system, walkways,

## *The Proposal and Alternatives*

seating, and signs are all in poor condition and would be updated and replaced. The existing parking area is approximately 600 square feet and only accommodates three vehicles. This parking area would be expanded to accommodate 6–12 vehicles (to a possible 1800 square feet) and would be used for evening programs and a trailhead parking for the Victoria Mine and Desert View hiking trails during the day. A ramada would be provided near the parking area for orientation and information bulletin boards.

*Wayside Exhibits.* Wayside exhibits will be used at various outdoor locations throughout the monument to provide information and orientation, and to interpret specific features. For the most part, these wayside exhibits will be restricted to non-wilderness areas associated with roads or other development where they can be used by substantial numbers of people. Key areas identified for new wayside exhibits include the park entrances, the scenic drives, Quitobaquito Spring, Dos Lomitas Ranch, Gachado Line Camp, Golden Bell Mine, and Bonita Well. A complete listing of proposed wayside exhibits and their story content is provided in the IP.

New wayside pullouts and exhibits would also be provided along State Route 85, but only if vehicle speeds can be reduced as discussed later in the Area Transportation Network section. Pull-offs, exhibits, and information on the park at the north and south entrances are especially important. There is little sense of arrival at either entrance, and many visitors do not realize they are in a national park area where special regulations and considerations are in force. To improve the sense of arrival and interpretive profile at these areas, pull-offs would be developed at locations with nice desert views and multiple wayside exhibit panels would be provided. Together with the existing entrance signs, these exhibits would welcome visitors, orient them with a map, introduce them to the Sonoran Desert, and let them know that certain regulations are in force to protect the park. The

addition of a short trail at the north entrance will be considered.

*Partnerships and Outreach Programs.* In response to the biosphere designation, the program of partnerships and outreach would be expanded to extend the park's interpretive message to a larger audience. Improved environmental awareness of deserts is a subject that is needed by the urban populations, people who do not make up a high percentage of park visitors. Audiences for outreach efforts could include Mexican, American, and American Indian school children in the region, and the desert dwelling populations of the American southwest, especially in Tucson and Phoenix. Printed material, audiovisual programs, and travelling exhibits would be the primary media used. Partners in the program would be crucial to its success, and could include both domestic and international universities, school teachers, federal and state agencies, and other educational institutions.

### **Camping**

Visitor interest in a primitive-style camping experience near parking is increasing and would consequently be expanded in two existing campgrounds: Twin Peaks and Alamo Canyon Wash. This type of camping allows for recreation in a somewhat primitive setting, away from the generators and large numbers of recreational vehicles in the main campground.

In the Twin Peaks Campground, a parking area and walk-in camping sites would be constructed up canyon from the present group campsite. Twenty walk-in sites would be located well above the mapped flash flood zone. The existing parking area would be expanded to accommodate 20 additional vehicles and one rest room would be added.

Camping at Alamo Canyon Wash Campground would be expanded on a limited basis in order to preserve the intimate characteristics at this drive-in/primitive campground. The four existing camping sites offer a primitive, private,

and very popular visitor experience. Initially, one additional tenting area containing four sites would be developed.

The campsites to be added would be located within the non-wilderness corridor and would not infringe upon wilderness values. Each camp site would be adequately distanced and visually separated from the others and would contain a parking area. One composting or vault type toilet would be provided, but no potable water would be available. Before any other campsites are added, a carrying capacity methodology would be applied to this area to determine appropriate use levels based on ensuring quality visitor experiences and resource protection.

### **Area Transportation Network**

Actions are proposed for both road and hiking trail networks in the park. Changes to State Route 85 and major trail routes are discussed below while changes affecting walking trails and roads in the Twin Peaks and Quitobaquito areas are described under the Development Concept Plan section of this document.

Improvements to park roads, including minor re-routes or realignments, are sometimes required in order to keep these road passable and to help reduce impacts caused by vehicles. These road improvements are not described here because it is not known when, where, and how often they are required. It is important to note that when these improvements are needed they would not affect designated wilderness areas and would comply with NEPA (the National Environmental Protection Act, the National Historic Preservation Act, and all other pertinent legislation.

**State Route 85.** Changes are proposed for State Route 85 in order to make the roadway more compatible with wilderness values, improve resource protection capabilities, and improve safety for visitors and residents. The increasing amount of commercial and other vehicle traffic travelling on State Route 85 is

one of the most significant impacts on the visitor experience and resources of the park. The majority of this traffic is passing through the park; many of these travelers never realize they have entered a unit of the National Park System.

The NPS would initiate a cooperative planning effort to find solutions that would help make this roadway more compatible with wilderness values, sensitive to resources, and safer for visitors and residents. Planning would be facilitated by the NPS and would be done with the cooperation of all international, federal, state, Tohono O'odham, and local agencies involved, as well as the general public. Funding for the planning effort would be sought from a variety of sources, both national and international, since the results could potentially affect the entire region. A range of alternatives would be developed during the planning process. The alternatives may include looking at the feasibility of an alternate route and international port-of-entry for commercial and other through traffic. The potential environmental, cultural, social, economic, and other impacts of any proposed solutions would be assessed in detail in the resulting plan.

If a solution for through traffic can be determined through this planning effort, the portion of State Route 85 in the park would be redesignated as a park road and administered by the NPS to NPS road standards. Entrance stations could then be developed at the north and south boundaries of the park. The existing entrance fee could be collected at these stations instead of at the booth located near the visitor center. The speed limit could be reduced and several pull-outs with interpretive information could be built along the roadway. The port-of-entry at Lukeville would continue to provide passage between the U.S. and Mexico.

In the meantime, the NPS would work to make more immediate changes to reduce the impacts of the road on visitors, on resources, and on wilderness values. Implementing any improvements may require cooperation between

## *The Proposal and Alternatives*

the NPS, the Arizona Department of Transportation, and other agencies responsible for transportation in the region. The NPS would work to establish cooperative relationships with these and other affected entities.

The following list identifies some immediate changes that could potentially occur:

- Informational signs would be added north and south of the park boundary to strengthen the identity of the park for those travelling on State Route 85.
- The existing speed limit would be reduced from 55 to 45 in the park to improve visitor safety and experience. (At least initially, signs, a public information campaign, and increased enforcement would also be required to effect a reduction in speed levels in the park.)
- Once the speed limit is reduced, the NPS would work toward constructing interpretive pull-outs along the road to enhance the visitor experience and opportunities.

**Trail Routes.** Several new trail routes are proposed and are depicted on the Alternative 1 map. Used by the majority of visitors, trails provide opportunities for recreation, exercise, and for access to natural history and cultural history sites. Many visitors have requested additional park trails of various lengths and difficulty. In addition, the IP identified some new trails to provide visitors access to resources and an understanding of the various aspects of the park's interpretive themes.

The following criteria were used to determine appropriate trail additions:

- offer access to all park's plant communities
- vary in length and difficulty
- offer a variety of interpretive media, including some with no media
- provide opportunity for solitude
- give access to places that illustrate geological stories
- give access to remote cultural history sites
- allow for proper maintenance

Based on these criteria, two types of trail experiences are offered: maintained and unmaintained. The IP proposes developing 11 new maintained trails totalling approximately 30 miles and describes the purpose and length of each. These trails would follow existing social trails where possible and are depicted together with the existing routes on the map of Alternative 1. Where feasible, all maintained trails would be made accessible to wheelchairs. In addition, more signs would be added to existing routes for safety reasons, including the trails to Bull Pasture, Victoria Mine, and Estes Canyon.

Due to the wilderness nature of most of the park, a variety of primitive, unmaintained trails are currently available to visitors and would be retained. These routes offer opportunities for solitude, access to remote cultural sites, and a different experience than the developed, maintained trails, or cross-country hiking. Signs would be erected to mark the beginnings of these unmaintained trail routes.

*Wherever possible, signs will be sensitive to the wilderness nature of the trails, and information will be conveyed at trail heads and through such alternative means as pamphlets.*

## **PARK OPERATIONS AND ASSOCIATED FACILITIES**

### **Staffing**

Specific staffing requests will be addressed through an operations plan to be prepared after the general management plan is approved. As a preliminary estimate, a total of 36 FTEs (Full Time Equivalents) are needed to fully implement this alternative which includes the amount needed to satisfy existing conditions in Alternative 2.

The estimate is a minimum number. In contrast, the NPS has recently implemented assessment programs that estimate ideal staffing numbers based on profiles of park

resources, management environments and visitors. Two programs, the Resource Management Assessment Program (RMAP) and the Visitor Resource Assessment Program (VRAP) have been used to determine the required amount of resources management, visitor protection, and administrative support staff for Organ Pipe Cactus NM: RMAP projections call for an additional 56.4 FTEs and VRAP projections call for a total of 22.3 FTEs. Minimum projections were determined for this alternative since it was felt that they were more achievable.

A breakdown follows of employee needs per each division. The one FTE listed for Administration refers to an international affairs/management assistant/community planner position responsible for coordinating the increasing number and variety of activities and programs that will occur with agencies, organizations, and private interests in Mexico and the United States.

<u>Division</u>	<u>Full Time Equivalents</u>
Maintenance	17.2
Natural and Cultural Resources Management	11.0
Interpretation	3.5
Visitor Protection	3.3
Administration	1.0

The park has an active Volunteers-in-Parks (VIP) program and would continue to utilize these people to help offset continuously expanding staffing needs.

**Facilities**

Several new facilities would be constructed and other existing facilities would be improved to:

- handle current as well as future space needs to accommodate employees;
- separate employee from visitor use areas; and
- provide a more efficient, productive, and safe working environment.

A description of the facilities follows. Each building would include a security system to deter vandalism. The location of the new facilities and their relationship to other facilities in the area are discussed as part of the Twin Peaks DCP.

The existing 5,900 square foot visitor center and administrative facility would be rehabilitated into the new administrative headquarters. Because of current space limitations, existing administrative functions are scattered throughout the park. The rehabilitated facility would consolidate all administrative functions, provide needed space, and separate the administrative areas from visitor use.

A new ranger operations and fire station would also be constructed. Approximately 4,600 square foot in size, this facility would contain:

- indoor storage for the new fire truck
- office and work space
- a dispatch office
- a detention center,
- a first aid station,
- supply and storage area, secured storage facilities including a walk-in evidence vault, gun and ammunition lockers, and safes for fee collection funds
- offices and work space
- a fitness training center with showers
- space for circulation, janitorial, and mechanical/electrical
- storage for equipment and ranger vehicles

A pad for helicopter support use would be located near this facility. The existing house trailer that currently functions as the ranger station is inadequate and would be removed when the new facility is constructed.

The existing maintenance facility is also inadequate and would be expanded to provide space for offices, work space, equipment, materials, and park and employee vehicles.

The expansion would include:

- approximately 2,000 square feet of office and work space

## *The Proposal and Alternatives*

- approximately 9,100 square feet of covered parking for park vehicles, employee vehicles, and park equipment
- approximately 2,400 square feet of covered storage space for materials
- approximately 850 square feet of 5 foot high concrete silos for materials storage
- an open air/drive through bay for repairs to heavy equipment
- loading ramps

### **Employee Housing**

Employee housing would continue to be provided in the Twin Peaks area of the park. Housing would be added into the existing area as shown later in the Twin Peaks DCP. The expansion would include:

- converting the two existing resource centers and two seasonal dormitories back to single family residences (this work would primarily be cosmetic as no major construction is needed)
- constructing ten apartment units in one or two buildings with a centrally located, covered parking area for seasonal employees and visiting researchers
- installing a satellite dish for the existing trailer village
- constructing a utility building containing laundry, showers, and food storage

No additional housing would be developed once the existing area is full. Additional needs would be secured on a free market basis in nearby communities.

A new community center would be constructed. The approximately 1,500 square foot facility would be located on a previously disturbed area. The center would include a social hall, kitchen, and rest rooms. A playground, volleyball court, and barbecue would be located outdoors, next to the new building. The park's original community facility, initially an employee residence, was recently converted to a resource center, and under this alternative, would be re-converted to a single family residence.

### **Cooperative Management and Planning in the Region**

As stated in the desired future statements:

The NPS would participate in facilitating a voluntary and cooperative effort with neighboring land managers to preserve, study, and wisely use the natural and cultural resources within an expanded Sonoran Desert Biosphere Reserve.

The park would support efforts to expand dialogues and recognition of the greater Sonoran Desert Biosphere Region. To achieve this goal, the park would continue to play a central and cooperative role in the International Sonoran Desert Alliance (ISDA) and any other groups of this kind. Formed during the general management plan planning process, ISDA is working to:

- promote international cooperative protection of resources, ecologically sound economic development, and improved responsiveness of public policy to local needs; and
- apply research and local indigenous knowledge to issues and needs in the greater Sonoran Desert region.

Representatives from three Nations—the United States, the Tohono O'odham, and Mexico—are participating in this unique effort to protect an ecosystem littered with political boundaries.

As described in the NCRMP, an action plan to implement the Man and the Biosphere Program would be developed and would focus on the international significance of the park. This effort would involve developing cooperative ventures with the adjacent Biosphere Reserves in Mexico.

As stated in the section on staffing, an international affairs / management assistant / community planner position would be established to work with ISDA, help develop the Biosphere Reserve action plan, and coordinate activities and programs involving other agencies, local communities, and nations.

## **DEVELOPMENT CONCEPT PLANS**

DCPs for the Twin Peaks and Quitobaquito Springs areas illustrate and describe proposed changes to the location, size, capacity, and function of the facilities in these areas. While other developments are proposed and previously described, DCPs were prepared for these particular areas to show the inter-relationship of the various visitor, operation, and transportation elements—in other words, how the pieces all fit and work together.

In addition to these two DCPs, revisions to the 1978 DCP for the Lukeville area are also discussed.

### **Twin Peaks**

The Twin Peaks area would continue to remain the location for administrative and maintenance facilities, a variety of visitor use facilities including a visitor center, and employee housing. As previously discussed, these changes are proposed to address insufficient work space, inadequate, outdated visitor facilities, and a lack of housing.

A complex of facilities would be developed to serve the expanding needs of the visitor, the Park, and the science community as depicted on the Twin Peaks DCP drawing. The area subject to flooding was determined to assist in planning and to ensure the safe location of developments. The proposed sustainable design guidelines would be utilized to ensure:

- the complex is visually compatible and that sustainable practices would be used;
- water conservation programs would be followed,
- the buildings would be located for energy efficiency in the hot, arid climate; and
- alternative energy and waste disposal measures would be considered.

The facilities complex includes a new 6,000 square foot visitor center, 12,000 square foot science and resources management center,

3,600 square foot plant nursery, 1,600 square foot greenhouse, and a visitor picnic area to be constructed near the existing park visitor center building. The existing 5,900 square foot visitor center and administrative facility would be rehabilitated as the administrative headquarters for the park. A new 4,600 square foot ranger operations and fire station would also be developed and the existing maintenance facility would be expanded. The maintenance facility expansion would include approximately 4,950 square feet of office, work and materials storage space and approximately 9,100 square feet of covered parking for park vehicles, employee vehicles, and park equipment. The functions and descriptions for each of these facilities has been previously discussed under the sections on Resource Management, Interpretation, and Park Operations.

The existing network of roads would be changed to clearly separate visitor areas from employee use areas. Approximately 1/2 mile of new two-lane road would be constructed and a 1500 foot length of two-lane road would be removed and the area restored to natural conditions. Visitors would turn from State Route 85 onto a new access road leading to the new visitor center and parking area. The parking area would include spaces for passenger vehicles as well as for buses and other over-sized recreational vehicles (RVs). Native vegetation and landforms would be used to shield the new development from view of State Route 85. Visitors could continue on this road to the Twin Peaks Campground and various hiking trailheads. A new starting point for Puerto Blanco Drive would spur off this central visitor road and would be easier for visitors to locate than the current location. A small loop would be incorporated at the start of the drive to give visitors the chance to turn around before starting on this one-way scenic drive.

A separate access road would serve employees and lead to the rehabilitated headquarters area and new employee parking area. This access road would connect with the existing road and

## *The Proposal and Alternatives*

would lead to the new ranger operations and fire station then on to the employee housing area. An employee parking area would be located next to the ranger operations and fire station and a new helicopter pad would be located a short, yet safe distance away. The existing road leading to the maintenance facility is located just beyond the site for the new ranger operations facility. The expansion for this facility would occur in previously disturbed areas.

The existing employee housing area lies along a loop at the end of the road. New housing and a community center for employees are proposed. These developments would be placed along the existing loop road, between existing buildings, in previously disturbed areas. In keeping with the sustainable design guidelines, native vegetation would be used to screen visible portions of the housing area from visitor use areas and provide an attractive setting for employees and their families. If any new construction is proposed in the future, it should be confined to the inside of the loop road. The natural landscape outside the loop road should be retained.

### **Quitobaquito Springs**

Due to safety, visitor experience, and resource protection concerns at Quitobaquito, a new trailhead and walking trail into the area are proposed and are depicted on the Quitobaquito Springs DCP drawing. Parking, an orientation sign, interpretive information, and a composting or vault type toilet would be developed at the trailhead about 3/4 miles north of the existing facilities on Puerto Blanco Drive. The NPS believes that moving the parking area north and out of sight from the current location will substantially decrease the incidence of vehicle break-ins and theft. The existing parking area and entrance road would be removed and the area studied for archeological significance, allowing approximately 23 acres to be restored to natural conditions (and eligible for wilderness designation). Administrative vehicle access to the international border would

need to be maintained and if possible, would occur in the non-wilderness corridor along Puerto Blanco Drive.

The proposed location of a .7 mile walking trail would improve the visitor experience of the Quitobaquito area. This trail would lead over a low saddle following the approximate route of the historic Old Salt Trail, and would be designed to be accessible for visitors with disabilities. As visitors continue down the gently sloping hillside, the richness of the riparian vegetation starts to become evident. The trail directs people near the spring and through the area ending up at the historic Quitobaquito pond. Along the way, visitors would have the opportunity to learn about the cultural use of the area and its natural resource significance. A well-defined trail network would be established at the pond. The new trail system would help protect resources and improve the area's value as a wildlife habitat by reducing vegetation trampling, erosion, and human use of more sensitive areas such as the edge of the pond. At this time, it is not known how the possible occurrence of the Africanized honey bees may affect use in this area. The design of the new trail system would take into account any necessary precautions including the use of informational materials and warning signs.

In the future, a study may be prepared to determine the feasibility of constructing an earthen or other structural barrier to reduce the visibility and noise coming from Mexico Highway 2, which is located about 100 feet south of the pond.

### **Lukeville DCP Revision**

This alternative reconsiders Lukeville's connection to the park and its role in providing visitor services. In the past, management direction for Lukeville has been toward its eventual acquisition and the operation of the commercial services on a concession basis. However, due to recent land transactions and the current NPS direction to locate park-related

services outside park boundaries, the 1978 Lukeville DCP is no longer viable. Instead, private enterprise in Lukeville, as well as in Ajo and Why, would continue to provide essential services to visitors and travelers as shown on the Lukeville Land Use and Facilities map. These services include: motel, full service campground with utility hook-up, gas station, automotive repair, grocery, cafe, laundromat, post office, Mexican insurance, and a convenience and auto parts store.

The NPS would work with the private land owners to develop stronger linkages between the park and Lukeville. There is a unique opportunity at Lukeville to take advantage of a new type of travel called "eco-tourism". Ecological based tourism emphasizes the preservation and appreciation of natural and cultural resources and environments. This type of tourism focuses on providing unique visitor experiences in special places and often leads to increased public knowledge of and support for preservation of critical resources. Coupled with the sustainable development ideals previously discussed, eco-tourism could lead to economic benefits for Lukeville. The park would also benefit by reducing impacts on natural systems in the park and enhancing opportunities for visitors to experience the Sonoran Desert.

Recently, the NPS has heard of a proposal to establish a regionally-based information and orientation station in this area. Emphasis would be on the type of resources and visitor opportunities in the Sonoran Desert region including: El Pinacate y el Gran Desierto de Altar (the Pinacate and the Great Desert) and Alto Golfo de California y Delta del Rio Colorado (Upper Gulf of California and Delta of the Colorado River) Biosphere Reserves in Mexico, the Cabeza Prieta National Wildlife Reserve, Bureau of Land Management lands, and the Tohono O'odham lands in both the U.S. and Mexico. This tri-national facility would reach visitors to the park as well as passers-through and would provide a means of increasing cross-cultural, cross-border, and cross-resource interest, education, and

preservation in the region. While the NPS has no plans to develop this facility, they would be willing to discuss opportunities for providing technical, financial, or other needed support for a facility of this nature in the area.

### **NAME, BOUNDARY, and WILDERNESS AREA CHANGES**

Changes to the park's name, boundaries, and wilderness areas are proposed to enhance resource protection and the visitor experience in the park and are discussed below.

#### **Redesignation**

The NPS would support proposing legislation to redesignate Organ Pipe Cactus NM as Sonoran Desert National Park in order to recognize the central and vital role the park has in representing and preserving the heart of the Sonoran Desert. While there are other NPS units in the Sonoran Desert, none of them so clearly exemplifies the unique features that define the Sonoran Desert ecosystem. Redesignation would help the park work more effectively to preserve the Sonoran Desert ecosystem by drawing attention to the significance and value of its varied resources and facilitating international and interagency cooperation.

National Monuments are generally established to protect a single feature, a unique occurrence of a natural phenomenon, or a specific area of historical importance. Organ Pipe Cactus NM is not a single feature unit, set aside only to protect the cactus for which it is named. The purpose and significance statements show that this unit of the Park System is a complex landscape containing globally significant Sonoran Desert ecosystems and nationally significant cultural resources. It contains plant and animal assemblages that occur here and nowhere else in the United States. Researchers in the natural science disciplines flock to the monument for a chance to study naturally functioning desert ecosystems. As a unit of the

## *The Proposal and Alternatives*

international Biosphere Reserve System, the monument has also received attention from the global scientific community. This area is also complex from an ethnographic perspective, sharing the histories of various cultures over 10,000 years of continuous occupation.

Organ Pipe Cactus NM is geographically and biologically central to the Sonoran Desert. When combined in a regional context with the surrounding Cabeza Prieta National Wildlife Refuge, El Pinacate Y el Gran Desierto del Altar (the Pinacate and Great Desert) and Alto Golfo de California y Delta del Rio Colorado (Upper Gulf of California and Delta of the Colorado River) Biosphere Reserves in Mexico, and the Tohono O'odham nation, the significance of the monument as central to the protected areas of the Sonoran Desert is clear. Redesignating this unit as Sonoran Desert National Park recognizes its true national significance and the wealth of resources it contains.

### **Boundary Adjustments**

Approximately 8.5 miles of the 30-mile-long common boundary between Organ Pipe Cactus NM and the Tohono O'odham Reservation would be adjusted to follow the natural watershed divide. The boundary currently follows the watershed divide through most of the Ajo Range then follows section lines through the south part of the Ajo Mountains, Ali Wua Pass, and the Sierra de Santa Rosa to the international boundary. As shown on the Alternative 1 map, the Tohono O'odham would receive approximately 1502.6 acres of monument land east of the crest and the NPS would receive approximately 825.5 acres of reservation lands in the Gu Vo District west of the crest. To effect an even acre land exchange, the balance of 677.1 acres would be added from reservation lands in the extreme western part of the Gunsight Hills north of Kuakatch Wash. The NPS could ensure protection for the scenic view of these hills which are distinctly visible from the north entrance of the park.

This boundary adjustment meets the NPS criteria for boundary adjustments in Special Directive 92-11. Congressional legislation would be required for the park to transfer any lands currently administered by the NPS, even though the same amount of acreage would be added. It is important to note that the 1502.6 acres of monument lands that would be transferred to the Tohono O'odham Reservation were not designated wilderness because of grazing leases held on the land. These leases have since expired.

Discussion involving a land exchange of this sort has occurred periodically between the NPS and the Tohono O'odham nation for more than a decade. No agreement has been reached due primarily to the fact that the land exchange was thought to involve two different districts in the reservation. Recent information has revealed that the entire land exchange can be done within the Gu Vo District.

### **Wilderness Additions**

Four areas of land within the park may be eligible for wilderness designation. These areas contained uses or developments that were inconsistent with wilderness values and were subsequently left out of the original wilderness boundaries. When implemented, other actions proposed by this plan would remove these incompatible elements allowing the lands to be eligible for wilderness designation. Once conditions are met, a legislative proposal would be prepared to propose their addition into wilderness.

The four areas are depicted on the Alternative 1 map and are described below.

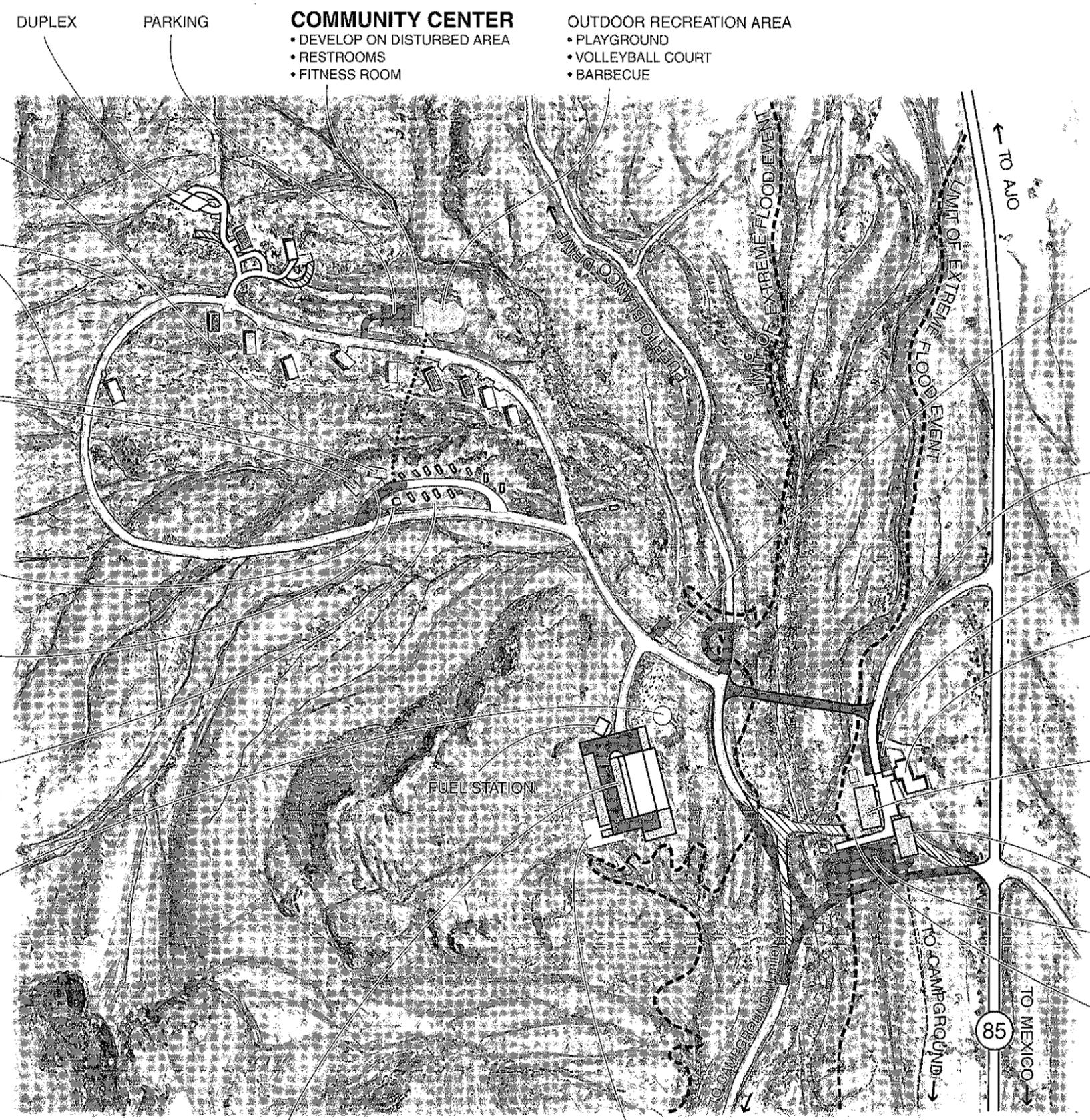
1. Two of the areas, totalling approximately 1,280 acres, are currently held in State trust and already designated "potential wilderness". One is near Bates Well and the other near Dos Lomitas. At this time, the two State sections cannot be acquired by the NPS without additional legislation at either the state or federal levels. They will continue to be



# SONORAN DESERT NATIONAL PARK

## ALTERNATIVE 1: *The Preferred Future*

**TWIN PEAKS DEVELOPMENT CONCEPT PLAN**  
UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE  
DSC/March 1995/157/20016



- DUPLEX
- PARKING
- EMPLOYEE HOUSING AREA**
- NO FUTURE DEVELOPMENT IN THIS AREA
- APARTMENTS
- COVERED PARKING
- UTILITY BUILDING
  - LAUNDRY/SHOWERS
  - FOOD STORAGE
- VIP TRAILER VILLAGE
  - MAINTAIN CURRENT CAPACITY
  - PROVIDE SATELLITE DISH
- HELICOPTER PAD

- COMMUNITY CENTER**
  - DEVELOP ON DISTURBED AREA
  - RESTROOMS
  - FITNESS ROOM
- OUTDOOR RECREATION AREA
  - PLAYGROUND
  - VOLLEYBALL COURT
  - BARBECUE

- RANGER OPERATIONS AND FIRE STATION**
  - OFFICES
  - COMMUNICATION CENTER
  - FIRST-AID STATION
  - FIRE TRUCK

EMPLOYEE ACCESS ROAD

EMPLOYEE PARKING SERVICE AND DELIVERY

- ADMINISTRATION FACILITY**
  - CONVERT EXISTING VISITOR CENTER

- SCIENCE AND RESOURCES MANAGEMENT CENTER**
  - WITH ADJACENT GREEN HOUSE AND NURSERY

**VISITOR CENTER**

VISITOR PARKING

- PICNIC AREA
  - RAMADAS
  - WATER

- MAINTENANCE AREA EXPANSION**
  - EXPANDED WORK/SHOP SPACE
  - COVERED STORAGE AND PARKING
  - WASH BAY
  - CONCRETE SILOS AND LOADING RAMPS

FORMER CORRAL AREA



ON MICROFILM



# SONORAN DESERT NATIONAL PARK

## ALTERNATIVE 1: *The Preferred Future*

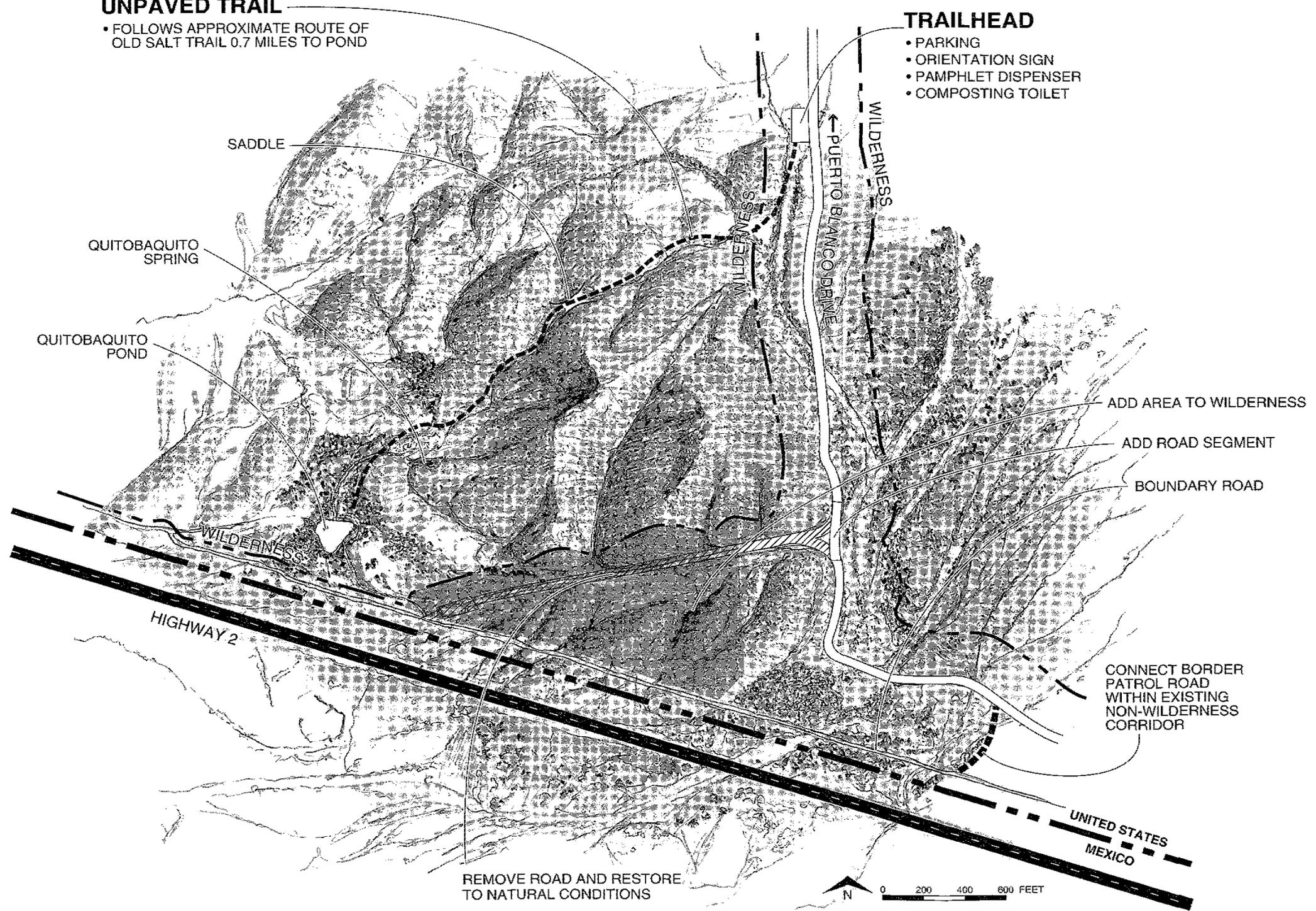
QUITOBAQUITO DCP  
UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE  
DSC/ March 1995/157/20018

### UNPAVED TRAIL

- FOLLOWS APPROXIMATE ROUTE OF OLD SALT TRAIL 0.7 MILES TO POND

### TRAILHEAD

- PARKING
- ORIENTATION SIGN
- PAMPHLET DISPENSER
- COMPOSTING TOILET



SADDLE

QUITOBAQUITO SPRING

QUITOBAQUITO POND

WILDERNESS

HIGHWAY 2

← PUERTO BLANCO DRIVE

WILDERNESS

WILDERNESS

ADD AREA TO WILDERNESS

ADD ROAD SEGMENT

BOUNDARY ROAD

CONNECT BORDER PATROL ROAD WITHIN EXISTING NON-WILDERNESS CORRIDOR

REMOVE ROAD AND RESTORE TO NATURAL CONDITIONS

0 200 400 600 FEET

UNITED STATES  
MEXICO

ON MICROFILM

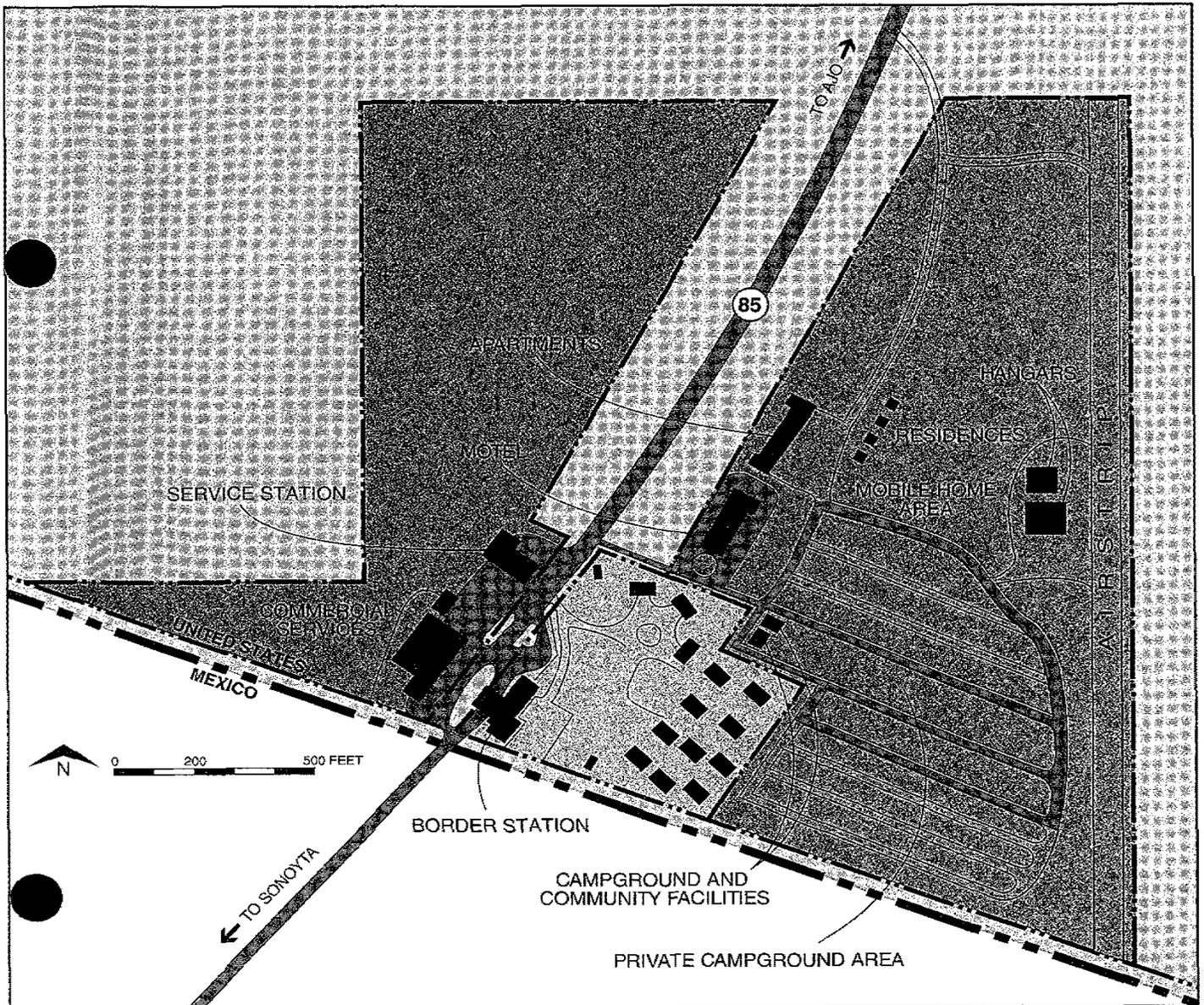


# ORGAN PIPE CACTUS NATIONAL MONUMENT

## LUKEVILLE *Land Ownership And Development*

UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE  
DSC/March 1995/157/20022

-  PRIVATELY OWNED LANDS
-  CUSTOMS AND IMMIGRATION RESERVE
-  PUBLIC RESERVE
-  ORGAN PIPE CACTUS NATIONAL MONUMENT
-  PAVED ROADS AND AREAS
-  DIRT ROADS



ON MICROFILM

managed under cooperative arrangement for the preservation of wilderness values until such time as they become available for purchase or exchange.

2. This plan proposes to relocate and bury the powerlines from a wilderness setting west of State Route 85 to the existing non-wilderness corridor along this road. The old lines and poles would be removed and the powerline road restored to natural conditions. These lands would then qualify to be added into the wilderness boundaries.

3. Once the boundary exchange occurs between the park and the Tohono O'odham, as previously discussed, the 1502.6 acres of new lands coming into the park would be evaluated for inclusion into the wilderness.

4. The proposed DCP for Quitobaquito calls for removing and restoring the natural condition of the existing access road. Once the parking and road are restored to natural conditions, the entire 23 acres would be suitable for wilderness designation.

## **PLAN IMPLEMENTATION and COSTS**

### **Implementation**

Development, program, and staffing additions proposed in this alternative would be implemented as funding becomes available. The highest development priority at this time is construction of the ranger operations and fire station followed by developments that serve to provide sufficient employee work space.

Partnerships with other agencies or groups could be established to implement several actions described in this alternative. The NPS would consider and seek to establish partnerships for funding or implementing appropriate projects that are regional in scope or would serve the public interests. Some examples of appropriate projects were described in various sections of this alternative and include: most of the new facilities,

especially the science and resources management center, nursery and greenhouse, various interpretive programs and services including the outreach programs, the planning effort for State Route 85, and eco-tourism in Lukeville.

Specific priorities for cultural and natural resource projects are identified in the NCRMP and would be revised as that document is updated.

**Cost Estimates.** The development and operational costs for implementing this proposal are described below. Development costs are one-time costs and are different from operational costs that would occur annually.

**Development Costs.** Total development cost for this alternative is \$17,983,000 and is broken down by park area. As stated in the Implementation section, the NPS would consider establishing partnerships for funding some of the estimated development costs. The following costs are based on conceptual type "Class C" cost figures developed by the Denver Service Center of the NPS for long-range budgetary planning. More detailed figures for these costs can be found in Appendix B and include projected advance planning costs. (The figures from the Appendix were rounded out to the nearest thousand before being inserted below).

*Twin Peaks.* Total costs for new construction or rehabilitation for development of the visitor center, science and resources management center, ranger operations and fire station, community center, expanded employee housing area and maintenance area, campground and amphitheater improvements, and roads and parking areas are estimated at \$14,544,000.

*Alamo Canyon Wash Campground.* The expansion and improvements for this area are estimated at \$121,600.

## *The Proposal and Alternatives*

*Quitobaquito Management Area.* Total costs for the new trailhead and parking area and restoration of the existing area is estimated at \$414,000.

*General Improvements Park-wide.* Costs for the new waysides, exhibits, signs, and trails is estimated at \$2,604,000.

**Operational Costs.** Annual operations and maintenance costs are expected to increase as proposed staffing and development are

implemented. These and other operational costs will be addressed in the Operations Plan to be prepared after approval of the general management plan. For a preliminary estimate, adding the full range of 36 FTEs plus an amount to cover the need for additional vehicles, supplies, materials, travel, and training, would increase the budget an additional \$1,930,000 annually. This amount includes the current staff needs discussed in Alternative 2.

## ALTERNATIVE 2: A Continuation of Existing Conditions

Alternative 2 is based on continuing existing courses of action within Organ Pipe Cactus NM and constitutes the NPS's no action alternative. It is generally based on the 1964 Master Plan as updated and refined by later NPS management and planning documents including: the 1987 Statement for Management, 1985 Land Protection Plan, 1978 Development Concept Plan for Lukeville, and 1994 NCRMP. The actions described in this alternative reflect existing park management strategies.

### LAND USE AND MANAGEMENT

#### Management Zones

The NPS uses a management zone system to indicate the management emphasis for specific lands and waters within a unit of the National Park System. Management zones currently used for Organ Pipe Cactus NM are described below and depicted on the Alternative 2 map.

**Natural Zone** – Most of the lands in Organ Pipe Cactus NM meet the NPS criteria for natural zone designation. Land in this zone is largely unaltered or is returning to a natural state. Some limited visitor use and management facilities are contained in this zone. This zone contains two subzones:

**Natural Environment Subzone** – This is the lands between wilderness units, along the international boundary and outside the developed area. It is managed to maintain natural resources and to provide visitor access to and enjoyment of those features. This Subzone currently contains 14,626 acres.

**Wilderness Subzone** – This includes the 312,600 acres of land designated as wilderness in November 1978 combined with potential wilderness of 1,240 acres

which are currently being managed as wilderness.

**Historic Zone** – Those sites which are listed on or are pending nominations to the National Register are in this zone. The sites overlap either the wilderness or natural environment subzones so are included in the acreage of those zones. While contained in the Historic Zone, Quitobaquito is managed as a natural site with cultural resources secondary.

**Development Zone** – This zone covers the main visitor use area, support facilities, and the existing development area at Lukeville. State Route 85 lies within this zone and connects the two main use areas. The total acreage in this zone is 520 acres.

**Special Use Zone** – This zone covers lands which are privately owned and contain uses not normally found in a natural area.

**Private Development Subzone** – This includes 65.33 acres of privately held lands in Lukeville.

**State Lands Subzone** – This includes two school sections. The acreage is included in the Natural Zone.

**U.S. Customs and Immigration Reserve Subzone** – This includes the border station and support facilities which total 8.18 acres.

### RESOURCE MANAGEMENT

#### Natural and Cultural Resources Management Plan

As described in Alternative 1, the NCRMP (1994) would continue to guide management of the park's natural and cultural resources. The priorities and project statements in this plan

## *The Proposal and Alternatives*

address data collection as well as internal and external issues relating to biodiversity, sensitive ecosystems, inventory and monitoring, and degradation of resource values. Project priorities would continue to be set based upon existing personnel levels and available project funding.

The NCRMP describes a full, multi-disciplinary approach to resources management. A few of the actions proposed in the document are summarized here because they were generated during the planning process or because they help resolve issues identified during scoping for this general management plan. In addition, the existing course of actions are described for various programs. Descriptions of the integrated management program, natural resource management, cultural resource preservation, and Native American consultation follows.

### **Comprehensive Management Program**

The Division of Natural and Cultural Resources Management has been established to address the full range of natural and cultural resource issues facing the park. Components of this program include, but are not limited to research, administrative support, interpretation, and information, ecological inventory and monitoring, wildlife management, and data management.

### **Natural Resource Management**

Many programs and management strategies are described in the NCRMP to guide management of the park's natural resources. Three major efforts are partially summarized here because of their relationship to issues identified during scoping.

*Ecological Monitoring Program (EMP).* As a result of the Ecological Monitoring Program (previously referred to as the Sensitive Ecosystems Program), the park has the framework for one of the most extensive and effective ecological research and inventorying

and monitoring programs in the NPS. The park would continue and expand this program as it provides a comprehensive and effective means for evaluating and managing natural resources.

*Air and Water Resources.* Most natural and cultural resource values are dependent on maintenance of relatively undisturbed surface, groundwater, and subsurface water resources. The most critical threats to these water resources are air and water pollution.

To protect air resources in the park, the NPS would recommend to the Arizona Department of Environmental Quality that the park be reclassified from a class II to a class I airshed as identified in the Clean Air Act of 1977. Having a class I designation would offer the highest level of protection for the park's air quality related values. In addition, an Aircraft Monitoring and Management Plan would be prepared to establish procedures for working with the military, monitoring overflights, and assessing their impacts on monument resources and the visitor experience.

The current water resources program in the park would continue and would be expanded. Both internal and external impacts on water resources in the park are currently being studied. Significant progress has been made recently in researching the effects from agricultural land use on water resources in the park. The park would continue this effort.

### **Resource Centers**

The two single family residences currently functioning as the resource centers would remain. These facilities are overutilized and will not accommodate recently hired resource specialists. The park is working to purchase and locate a 1,400 square foot modular office building near the visitor center/administrative offices building in the Twin Peaks area in order to help offset the existing and growing shortage of office space.



# ORGAN PIPE CACTUS NATIONAL MONUMENT

## ALTERNATIVE 2: *A Continuation Of Existing Conditions*

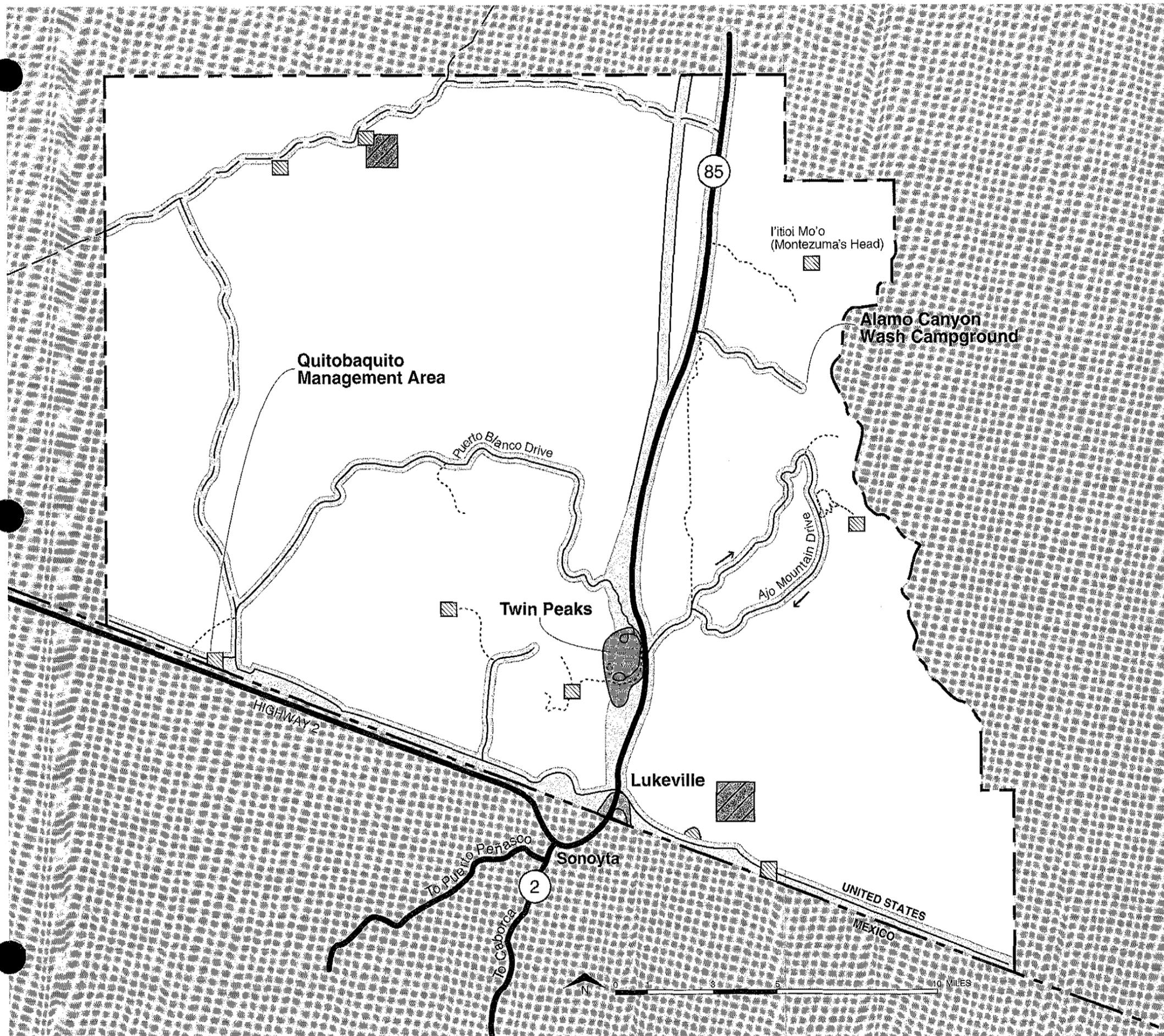
ORGAN PIPE CACTUS NATIONAL MONUMENT  
UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE  
DSC/March 1995/157/20015

### MANAGEMENT ZONES

-  Development Zone
-  Historic Zone
-  Special Use Zone — Private Development Subzone
-  Special Use Zone — State Lands Subzone
-  Special Use Zone — U.S. Customs and Immigration Reserve Subzone
-  Natural Zone — Natural Environment Subzone
-  Natural Zone — Wilderness Subzone

### GENERAL LEGEND

-  Potential Wilderness Additions
-  Existing Trails
-  Paved Roads
-  Graded Dirt Road
-  Unimproved Dirt Road



ON MICROFILM

## **Cultural Resource Preservation**

As for Alternative 1, evaluations of archeological, ethnographic, and historic resources for National Register listing would continue. Historic properties listed in or eligible for listing on the National Register of Historic Places would continue to be stabilized as funds become available. Archeological, ethnographic, and historic research would continue when possible with available research grants, personnel, and funding from construction projects. All new park developments would be surveyed for possible archeological resources and if needed, mitigation measures, such as avoidance or data recovery, would be implemented to protect those resources.

As stated in the NCRMP, a cultural resources management specialist would be hired to coordinate the cultural resources program in the park.

## **Native American Consultation**

Consultation with American Indian groups would continue to grow, as it has over the past few years, on an as needed basis for various cooperative studies, projects, and plans.

## **Visual Resource Preservation**

In accordance with NEPA, no additional actions would be undertaken in this alternative to enhance the protection of visual resources.

## **VISITOR USE AND ASSOCIATED FACILITIES**

The park would update various programs and facilities regarding interpretation and the area transportation network to provide visitors the essential opportunities to experience the special values of the park. The existing camping facilities at Twin Peaks and Alamo Canyon Wash Campgrounds would remain, and consequently, are not described.

## **Interpretation**

The objectives for the interpretation program discussed in Alternative 1 are also common to this alternative. The park's special designations as a wilderness and as a Biosphere Reserve, broadened the park's interpretive mandate. The park needs to interpret not only the character and importance of the park's resource, but also the park's wilderness values and its role in an international network of protected samples of the world's major ecosystem types.

**Interpretive Themes.** An Interpretive Prospectus was prepared partly in response to the need for a fresh look at the messages being delivered to the park visitors and partly in response to this planning effort which began in 1988. The new themes identified in the IP and presented in Alternative 1 are also common to this alternative.

**Interpretive Facilities and Programs.** Interim measures for interpretive facilities and programs were proposed in the IP. Because the IP relied on ideas generated by the general management plan effort, interim measures were proposed to allow the park to improve facilities and programs that had grown to be inadequate. These measures represent the actions the park is currently taking to carry out the objectives and themes of the interpretive program. They are described below.

*Existing Visitor Center.* The existing visitor center would remain at its present location in the Twin Peaks area, but would continue to undergo improvements. In response to the IP, the park recently revised its 20 year old slide program and replaced its outdated audio-visual equipment. New carpeting will be installed to improve acoustics. The walls of the theater can now be used for special, changeable shows of graphics. In addition, new programs would be added to accommodate disabled, visually impaired, hearing impaired, and non-English speaking visitors.

## *The Proposal and Alternatives*

New exhibits, improved exhibits, and new audio-visual programs would be developed based on subject matter best suited to this medium and would replace those in the existing exhibit area.

*Campground Amphitheater.* Due to its poor condition, the seating, lighting, screen, projection booth, wiring, and trail would be upgraded as described in Alternative 1. The existing parking area would remain.

*Partnerships and Outreach.* In response to the biosphere reserve designation, partnerships and outreach programs would be developed as described in Alternative 1. Partners in the program would be crucial to this program's success, and could include universities, school teachers, federal and state agencies, and other educational institutions.

### **Area Transportation Network**

**State Route 85.** State Route 85 would continue to serve as a through traffic corridor between Mexico and the United States. Arizona State Department of Transportation has recently studied and identified possible improvements to the road due to anticipated future increases in traffic as a result of NAFTA. The park would work closely with the state, local agencies, and all other interested people to ensure the road remains two lanes and that improvements would increase travelers safety and reduce current impacts to vegetation and wildlife.

**Trail Routes.** Several improvements would be made to the existing trail network in the park. The Visitor Center Nature Trail and Campground Perimeter Trail would be made accessible for wheelchairs. Signs or wayside exhibits would be posted at the start of the Campground Perimeter Trail as well as the Estes Canyon/Bull Pasture Trail, Palo Verde Trail, and Victoria Mine Trail.

The Visitor Center Nature Trail would also be lengthened. If possible, visual and noise intrusions would be reduced on this trail to

provide visitors a short, accessible experience of the Sonoran Desert environment.

As described in Alternative 1, the existing unmaintained, primitive trails would remain, but some form of modest signing would be used to mark their beginnings.

## **OPERATIONS AND ASSOCIATED FACILITIES**

### **Staffing**

As in Alternative 1, specific staffing requests will be addressed through an operations plan to be prepared after the general management plan is approved. The park currently needs approximately 27.3 additional FTEs to fully implement existing conditions including the actions described in this alternative. A breakdown follows of employee needs per each division.

<u>Division</u>	<u>Full Time Equivalents</u>
Maintenance	12.2
Natural Resources	6.0
Cultural Resources	4.5
Interpretation	2.0
Visitor Protection	2.6

As stated in Alternative 1, the park would continue to utilize VIPs to help offset existing staff needs.

### **Facilities**

The existing administrative and maintenance facilities would remain in the Twin Peaks area. Modular building units would be used to help accommodate increases in staff and space needs. Any new structures would be located near the existing administrative building or within the housing area.

The park is working to construct a new 3,000 square foot facility similar in function to the ranger operations and fire station described in

Alternative 1. This building would primarily be used to provide indoor storage for a new fire truck and would also accommodate some ranger offices, supply and equipment storage, and secured storage for evidence, guns, ammunition, and collected funds. As in Alternative 1, the existing house trailer that currently functions as the ranger operation center is inadequate and would be removed when the new facility is constructed.

### **Employee Housing**

Employee housing would continue to be provided in the Twin Peaks area. Any additional needs, beyond what can be made available in the park, would be accommodated through a free market basis in Ajo or other surrounding communities.

### **Cooperative Management and Planning in the Region**

As described in Alternative 1, the NPS would continue efforts to expand dialogues and recognition of the Sonoran Desert Biosphere Region including developing an action plan to implement the Man and the Biosphere Program. There was not a vehicle in place to facilitate a cooperative relationship in managing resources in the Sonoran Desert Region before the onset of this planning effort. Now that ISDA has been formed, the park would continue its work with this group as described in Alternative 1.

### **DEVELOPMENT CONCEPT PLANS**

DCPs for Twin Peaks and Quitobaquito Springs have also been developed for this alternative. These plans depict the existing conditions and improvements proposed under this alternative as shown on the drawings. Changes to the 1978 DCP for Lukeville are also described.

#### **Twin Peaks**

The Twin Peaks area would remain virtually the same. Improvements proposed would include

upgrading the amphitheater, the lengthening of the Visitor Center Nature Trail, and adding new modular building units or other temporary structures, as needed for operations and housing.

#### **Quitobaquito Springs**

Due to safety and resource protection concerns, improvements are proposed for the existing facilities at Quitobaquito Springs. To improve security, the area would be staffed during daylight hours of the high visitation period. Interpretation of the area would be provided by a pamphlet, and guided tours would be provided at scheduled times. In the future, the park may examine the feasibility of constructing a barrier to reduce the visual and auditory impacts caused by the proximity of Mexico's highway 2 to the Quitobaquito area.

At the trailhead, the vehicle circulation and definition of parking spaces would be improved. A sign orientating visitors to the area and a pamphlet dispenser would be provided. The existing toilet facilities would be improved and moved to a less conspicuous location.

#### **Lukeville**

The park would continue to implement the basic planning concepts identified in the Lukeville Development Concept Plan (1978) and further defined by the Land Protection Plan (1985). These principles include:

- provide only high quality facilities that do not duplicate existing visitor services
- make all new facilities architecturally compatible with the park's design guidelines
- locate housing and maintenance facilities not generally open to the public, out of normal visitor use areas
- allow only minimal intrusion into undisturbed areas by keeping new developments as compact as possible

## *The Proposal and Alternatives*

- continue to permit visitor demand for basic services determine the nature and extent of commercial services
- phase development of new facilities to allow for changing conditions

While these general principles would continue to be followed, several recommendations made in this DCP would not be fulfilled. The DCP calls for NPS employee housing and maintenance facilities to be developed in Lukeville. The NPS feels they are better able to secure equipment and facilities in their existing location at Twin Peaks. Employee housing would also be retained at Twin Peaks for safety concerns and since it is easier to separate this area from those used by visitors.

### **NAME, BOUNDARY, AND WILDERNESS AREA CHANGES**

Few changes are proposed in this alternative. The name would remain Organ Pipe Cactus National Monument. Also, no boundary adjustments are proposed for this alternative. The idea of a land exchange between the NPS and the Tohono O'odham Nation along the crest of the Ajo Mountains has been discussed for some time. However, in accordance with National Environmental Policy Act of 1969 (NEPA), this proposal is not being presented under this alternative in order to compare the potential consequences of not making the exchange versus making the land exchange as proposed in Alternative 1.

### **Wilderness Additions**

The following areas would be proposed for wilderness designation and are depicted on the Alternative 2 map, and are also described as part of the four areas proposed for wilderness designation under Alternative 1.

1. The two areas totalling 1,280 acres currently held in State trust that lie near

Bates Well and Dos Lomitas. These areas are already designated as "potential wilderness" in the wilderness legislation.

## **PLAN IMPLEMENTATION and COSTS**

### **Implementation**

As stated in Alternative 1, development, program, and staffing additions proposed in this alternative would be implemented as funding becomes available. The 3,000 square foot fire station and ranger office would remain the highest development priority, followed by the 1,400 square foot modular office building. Priorities for other efforts would remain as identified in approved documents, such as the NCRMP (1994).

### **Cost Estimates**

The development and operational costs for implementing this alternative are described below. Development costs are one-time costs and are different from operational costs that would occur annually.

**Development Costs.** As in Alternative 1, Denver Service Center "Class C" cost estimates were used to project development costs. Total development costs for this alternative are estimated at \$3,701,400 and are broken down below by park area. See Appendix B for more detailed figures.

*Twin Peaks.* Improvements to the visitor center, campground amphitheater, trails and the addition of the fire station and ranger office and resource center office is estimated to cost \$3,260,000.

*Quitobaquito Springs.* Costs to improve the trailhead area and add new signs and composting toilet facilities is estimated at \$127,000



# ORGAN PIPE CACTUS NATIONAL MONUMENT

## ALTERNATIVE 2: *A Continuation Of Existing Conditions*

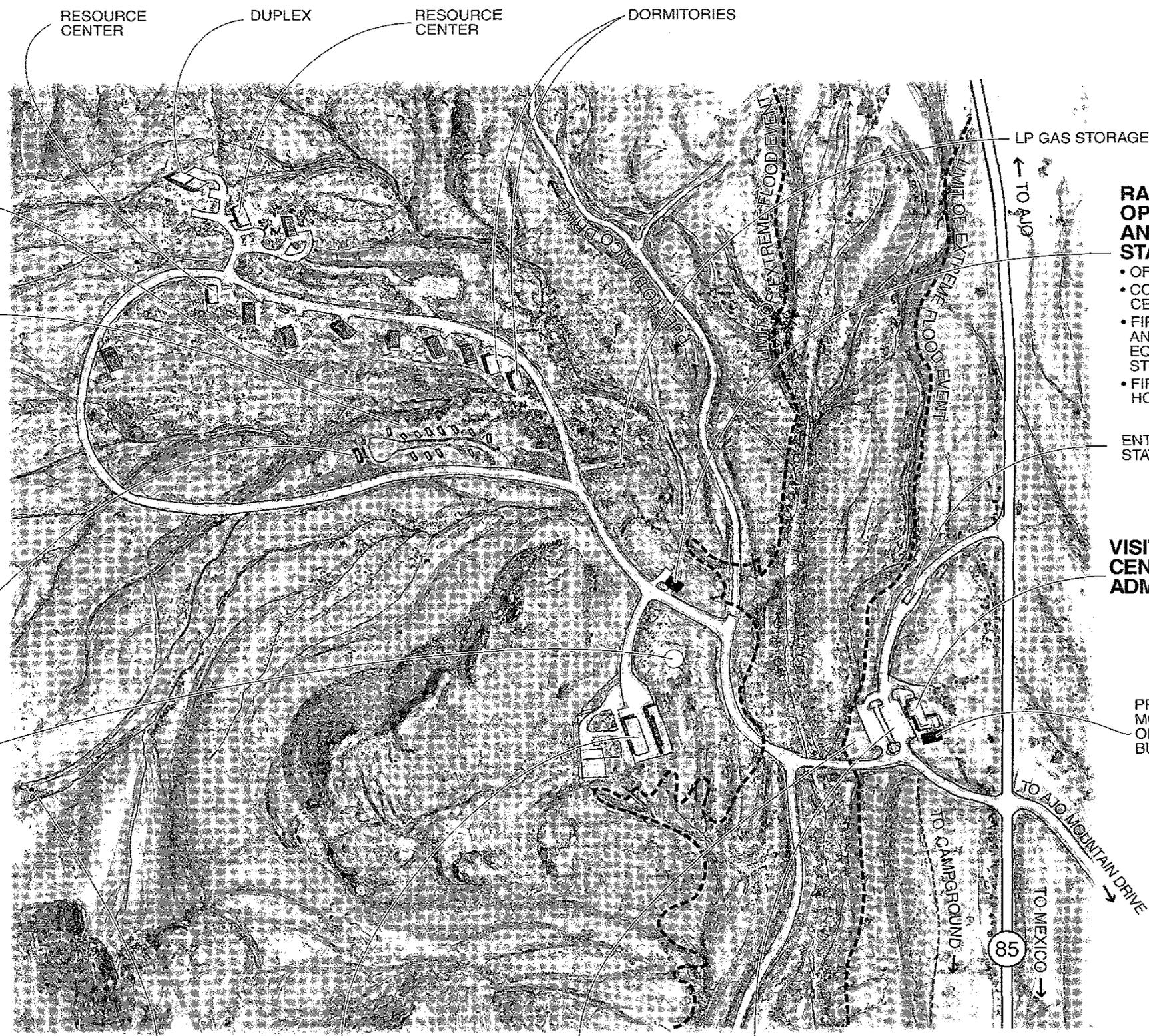
### TWIN PEAKS DEVELOPMENT CONCEPT PLAN

UNITED STATES DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE

DSC/March 1995/157/20017

-  EXISTING SINGLE FAMILY RESIDENCES
-  EXISTING TRAIL



RESOURCE CENTER

DUPLEX

RESOURCE CENTER

DORMITORIES

EMPLOYEE HOUSING AREA

VIP TRAILER VILLAGE (Volunteer-In-Parks)

CONVERT EXISTING RANGER OFFICE TO OTHER OFFICE SPACE

HELICOPTER PAD

WATER TANK

MAINTENANCE AREA

PICNIC AREA

VISITOR PARKING

LP GAS STORAGE

RANGER OPERATIONS AND FIRE STATION

- OFFICES
- COMMUNICATION CENTER
- FIRST-AID STATION AND EMERGENCY EQUIPMENT STORAGE
- FIRE ENGINE HOUSE

ENTRANCE STATION

VISITOR CENTER AND ADMINISTRATION

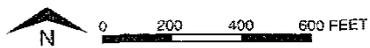
PROPOSED MODULAR OFFICE BUILDING

TO AJO

TO CAMP ROUND

TO MEXICO

TO AJO MOUNTAIN DRIVE



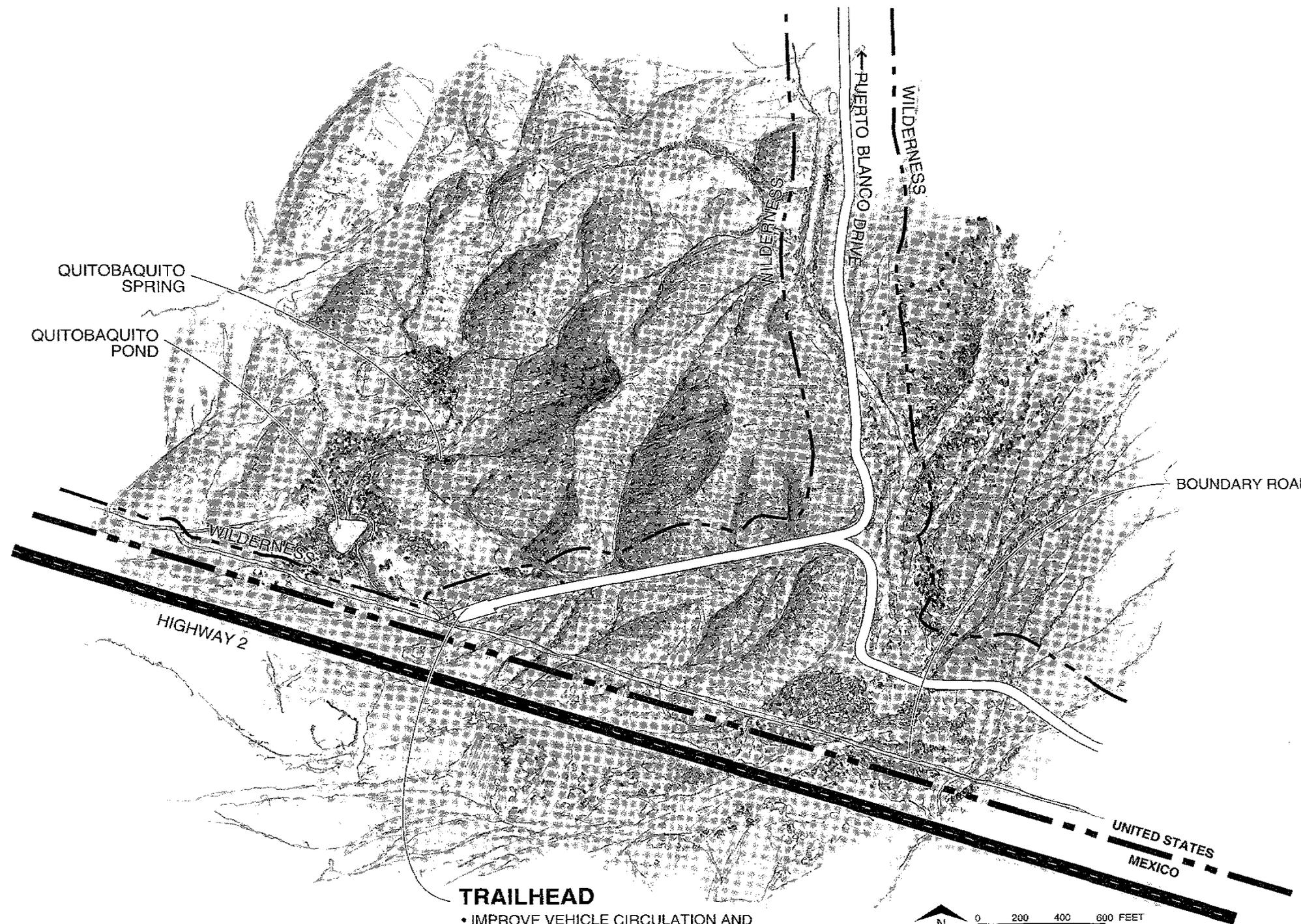
ON MICROFILM



ORGAN PIPE CACTUS  
NATIONAL MONUMENT

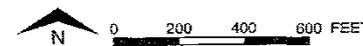
**ALTERNATIVE 2:  
A Continuation Of  
Existing Conditions**

QUITOBAQUITO DCP  
UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE  
DSC/March 1995/157/20019



**TRAILHEAD**

- IMPROVE VEHICLE CIRCULATION AND PARKING SPACE DEFINITION
- PROVIDE TRAILHEAD SIGN WITH ORIENTATION TO AREA AND PAMPHLET DISPENSER
- PROVIDE COMPOSTING TOILET IN A CONVENIENT AND LESS CONSPICUOUS LOCATION



ON MICROFILM

*General Park-wide.* Estimated costs to add waysides, exhibits, and informational signs, improve the visitor center nature trail for accessibility, is \$314,400

**Operational Costs.** Annual operations and maintenance costs are expected to increase as proposed staffing and development are implemented. These and other operational costs will be addressed in the Operations Plan to be prepared after approval of the general

management plan. For a preliminary estimate, adding the full range of 27.3 FTEs plus 20% to cover the need for additional vehicles, supplies, materials, travel, and training, would increase the budget an additional \$1,537,000.

AFFECTED  
ENVIRONMENTS



# THE NATURAL ENVIRONMENT

## SPECIAL DESIGNATIONS

### Biosphere Reserve

Organ Pipe Cactus NM is an area of international significance. In 1976, the United Nations Educational, Scientific and Cultural Organization (UNESCO) designated the monument a biosphere reserve under the direction of its Man and the Biosphere (MAB) program. Biosphere reserves constitute an international network of protected examples of major ecosystems that provide a baseline against which human impact on the environment can be assessed. More than 70 nations currently participate in the MAB program; of the nearly 50 biosphere reserves in the U.S., more than half are NPS areas.

The Sonoran Desert biogeographic region covers approximately 76.4 million acres in southern Arizona and northern Mexico, as indicated on the Sonoran Desert Region map, and is among the world's most biologically diverse deserts. Organ Pipe Cactus NM, located geographically near the center of the region, protects only a small portion (330,689 acres) of this vast area.

The geographic extent of a future Sonoran Desert biosphere reserve region is currently being discussed within the Arizona-Sonora transborder area by the International Sonoran Desert Alliance. Potential sites to be included are adjacent lands around the Organ Pipe Cactus NM Biosphere Reserve and other areas of ecological importance such as El Pinacate Y el Gran Desierto de Altar (The Pinacate and Great Desert) biosphere reserve in northern Sonora, Mexico.

The region is faced with a multitude of resource threats and issues that transcend cultural, jurisdictional, and international boundaries. The greatest threats to monument resources result from adjacent land use, particularly urbanization and agricultural development occurring in the neighboring state of Sonora, Mexico. Of paramount concern are the effects of herbicide and pesticide drift, invasion of non-native flora and fauna, and groundwater

depletion in the Sonoyta Valley. To effectively deal with these problems, communication between land managers, government and tribal organizations, environmental groups, and private individuals is essential. One means of facilitating this communication and addressing these cross-boundary concerns is through the MAB program.

At Organ Pipe Cactus NM, the MAB philosophy has been assimilated into nearly all aspects of park operations and management. Regionally, the monument serves as a primary natural resource monitoring site and as a focal point for educating people on the role of a biosphere reserve. Many of the monument's long-term resource inventory and monitoring projects initiated as part of the Ecological Monitoring Program (formerly the Sensitive Ecosystems Program) are MAB-oriented, particularly those dealing with adjacent land use trends in Sonora. Monument staff also work cooperatively with officials from Mexico and the Tohono O'odham Nation on issues of joint concern and interest such as groundwater depletion, land use, natural and cultural resource protection, and environmental education. An example of the latter is the recently created cross-cultural environmental education program called "Juntos". The nature and complexity of existing and potential threats to monument resources requires continued cooperation and communication among all monument neighbors if effective solutions are to be found.

### Organ Pipe Cactus Wilderness

In 1978, Congress passed Public Law 95-625 which created the Organ Pipe Cactus Wilderness. Ninety-five percent of the monument has been established as designated wilderness (312,600 acres) or authorized as potential wilderness (1,280 acres). Two sections of Arizona state trust lands constitute potential wilderness. These parcels of 640 acres each, located near Bates Well and Dos Lomitas, are managed for the preservation of wilderness values under a cooperative arrangement between the NPS and the state.

The Wilderness Act of 1964 describes wilderness as an area "untrammeled by man...retaining its primeval character and influence, without permanent improvements or human habitation...[with] outstanding opportunities for solitude or a primitive and unconfined type of recreation." Management of the Organ Pipe Cactus Wilderness must comply with the Wilderness Act and NPS management policies. These policies contend that when wilderness has been established within a NPS unit, an additional statutory purpose of the park becomes the preservation of wilderness resources and values (NPS 1988).

The primary management responsibility for the Organ Pipe Cactus Wilderness is to ensure resource protection while providing for appropriate use. Management actions are aimed at offering visitor opportunities for primitive and unconfined recreation and encouraging and facilitating those uses that depend on, yet do not degrade the wilderness.

In accordance with its management policies, the NPS would manage areas of potential wilderness as if they were designated wilderness, and will strive to eliminate those conditions that preclude wilderness designation. Any new land added to the monument would be evaluated for its suitability as wilderness as well as those areas currently within the monument where incompatible conditions would be removed.

NPS management policies also state that each park containing wilderness will develop a wilderness management plan that guides the protection, management, and use of the area. Although a backcountry management plan directing visitor use and outlining regulations, use zones, carrying capacities, and special conditions was approved in 1985, a wilderness management plan providing specific guidelines for research, search and rescue, and administrative use of the Organ Pipe Cactus Wilderness does not exist.

## **PHYSIOGRAPHY AND GEOLOGY**

### **Physiography**

Organ Pipe Cactus NM lies within the Basin and Range Physiographic Province. Its topography is characterized by a series of steep, rugged, mountain ranges oriented to the

north-northwest, separated by broad alluvial valleys as indicated on the Areas and Features of Organ Pipe Cactus NM map. These expansive, gently sloping valleys, which encompass roughly two-thirds of the monument, are composed of alluvial material transported from the mountain slopes by ephemeral (temporary) streams and sheet flow.

Elevations range from 4,808 feet (1,466 meters) at the top of Mt. Ajo, to less than 1,000 feet (305 meters) at the extreme southwest and northwest corners of the monument. The Ajo Mountains, the most prominent topographic feature in the area, form the monument's eastern boundary. These mountains are separated from the smaller Growler, Bates, Puerto Blanco, and Sonoyta Mountains by the Valley of the Ajo and Sonoyta Valley. In the southwest section of the monument lie the Cipriano, Sonoyta and Quitobaquito Hills, and the La Abra Plain. The western portion of the monument lies in the Growler Valley. The western portion of the monument lies in the Growler Valley.

### **Geology**

The earliest rock formations in Organ Pipe Cactus NM date from the Precambrian era. The mountain ranges are composed largely of volcanic rocks, whereas the broad valleys consist primarily of unconsolidated Quaternary silt, sand, and gravel alluvium. The geology of Organ Pipe Cactus NM has been previously described by Wilson et al. (1960), Simmons (1965), Hunt (1972a), and Jones (1974).

During the Paleozoic era (500–200 million years B.C.E. [Before the Common Era]), much of the land in the monument was submerged beneath a sea. Near the beginning of the Mesozoic era (200–100 million years B.C.E.), the sea subsided. Molten lava later intruded, forcing its way toward the earth's surface. The first of these intrusions occurred during the Cretaceous period forming basement gneiss; the second occurred during the Tertiary period creating the tertiary granites, some of which are evident in the Sonoyta Hills. As some of the magma cooled, it also produced copper deposits such as those found in the monument and near Ajo (Hunt 1972b). The most recent and extensive of these igneous intrusions, possibly of Plio–Pleistocene age, forms the rimrock of the southern Growler Mountains and Cipriano Hills (Butler and Lewis 1940).



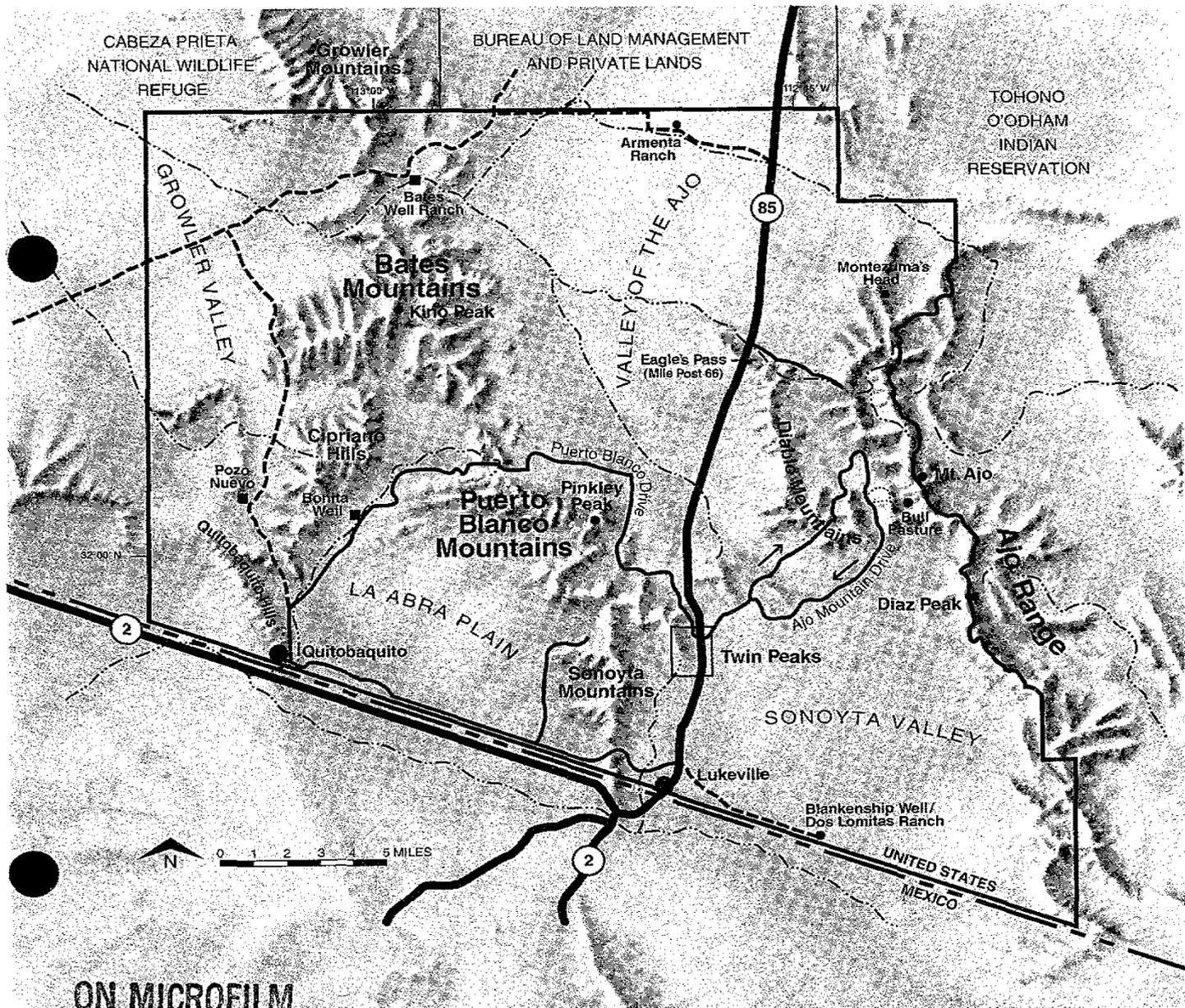
# ORGAN PIPE CACTUS

NATIONAL MONUMENT

## AREAS AND FEATURES OF ORGAN PIPE CACTUS NATIONAL MONUMENT

UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE  
DSC/March 1995/157/20021

-  GRADED DIRT ROAD
-  HISTORICAL SITE
-  UNIMPROVED DIRT ROAD
-  MAJOR WASHES



ON MICROFILM

Early and mid-Tertiary rocks form the bulk of the monument's mountain ranges. Block-faulting, which occurred during the late Tertiary, coupled with subsequent erosion, is responsible for their present-day appearance. The type of substrate, the extent of uplift, and the amount of ensuing erosion account for the variability among mountains.

## **SOILS**

### **Soil Characteristics**

Soil formation is slow in arid environments. Because chemical decomposition of parent material is hindered by a lack of precipitation, monument soils have minimal profile development. These soils possess a low organic content due to the oxidation of organic matter at high ambient temperatures, low rates of biological decomposition, and the transport of soil to drainages during heavy rains.

Caliche is a common feature of desert soils where low precipitation and high temperatures impede rainfall percolation. The depth of a caliche layer is often correlated with rainfall: deeper deposits correspond with higher levels of precipitation and deeper soil infiltration. These precipitated carbonates, usually in the form of calcium carbonate, vary in thickness from thin, poorly consolidated deposits, to thick impermeable layers that restrict water percolation and root development.

All monument soils are classified as aridosols (hot arid soils). In 1972, the Soil Conservation Service conducted a soil survey of the monument and identified soils as belonging to 16 soil series and one rocky association (Chamberlin 1972). Soils on the upper bajadas have a coarser texture and a greater mixture of large rock fragments. These deep, gravelly, calcareous (calcium-rich) soils comprise 38% of the monument. Soils on mountain pediments, which are typically shallow with protruding bedrock, account for 21.4%, whereas deep, fine-grained soils on floodplains and alluvial fans constitute 18.1% of the monument. In addition, rock outcrops account for 17.4%, recently deposited alluvium along eroded stream channels, 3.8%, and deep soils on valley plains and terraces, 0.5% of the monument.

Most of the soils in the Valley of the Ajo are sandy and gravelly sandy loams. Soils in the Growler Valley are predominately sandy loam, ranging in texture from very fine sand to gravel, whereas soils in Senita Basin are primarily very stony and gravelly loam. Most of the soils of the La Abra Plain and Sonoyta Valley are very gravelly loam with considerable amounts of alluvium deposited along the drainages in the Sonoyta Valley. The upper reaches of the Ajo, Bates, and Puerto Blanco mountains are composed of rock, while the lower slopes of these mountains as well as the majority of the lower hills in the monument, such as Quitobaquito and Cipriano Hills, are very stony loam (Chamberlin 1972).

Desert pavement, a soil characteristic in which the surface is covered by a closely packed pebble layer, is found in the Growler and Sonoyta valleys. These saline (salty) soils possess low infiltration rates and therefore, a low moisture content. Such areas are typically devoid of vegetation, even though adjacent areas often support creosotebush-dominated communities.

Microphytic soil crusts, composed of lichens, mosses, green algae, and cyanobacteria, are an important component of desert ecosystems. These crusts, which provide the major source of fixed nitrogen in desert regions, are very susceptible to disturbance, including trampling, fire, and air pollution. Baseline data are needed to assess the relationship of microphytic crusts to other environmental components and the role they play in the overall functioning of monument ecosystems.

### **Soil Erosion**

Widespread soil loss caused by wind and water erosion is most pronounced at Armenta and Dos Lomitas ranches where 175 acres are affected. At Armenta Ranch, the affected area encompasses roughly 65 acres, and soil losses are estimated between 25–50 tons/year. In contrast, the affected area at Dos Lomitas Ranch is approximately 110 acres, with soil losses ranging between 17–34 tons/year (Brown 1989). Cattle grazing occurred in the monument from about 1915 to 1978. Grazing pressure and trampling induced soil losses, which have resulted in vegetation and landscape changes including deepening of arroyos and

## *Affected Environments*

channel headcutting. Such consequences create perpetual road maintenance problems at both locations.

In 1968, personnel from the Soil Conservation Service (now the Natural Resources Conservation Service) inspected badly eroded areas of the monument. Based on their recommendations, several hundred acres of dikes have been constructed in the vicinity of Blankenship Ranch and the Growler Valley to disperse surface water runoff. At other locations, experimental attempts at reducing channel headcutting have been made by placing brush and rock in the cuts. Recommendations for controlling main and side channel erosion at Armenta and Dos Lomitas ranches include limited channelization work as well as constructing small earthen dikes and brush and rock structures. Since the 1970s, gully erosion has been monitored at both ranch sites. These data indicate that some soil stability has been achieved over the years, and site revegetation is beginning to occur in some areas (Brown 1989).

### **AIR RESOURCES**

Organ Pipe Cactus NM has been designated a class II airshed as identified in the Clean Air Act (1977). The law mandates that visibility and other air quality-related values within the monument be protected. Class I areas have the highest air quality standards, and class III, the lowest. Most NPS areas with designated wilderness or high visitation levels are class I sites; no areas possess a class III designation. Monitoring of the monument's air quality has been limited. Although baseline data exist for particulate matter and precipitation chemistry, similar data are lacking for gaseous pollutants and visibility monitoring. The effects of gaseous pollutants on monument resources, particularly flora, is unknown. Since the closing of the copper smelter in nearby Ajo, Arizona in 1985, air quality at the monument has improved dramatically. Vistas from within the monument may extend for more than 70 miles. Such views are a prime visitor resource, as is the ability to view a clear night sky.

Although Organ Pipe Cactus NM possesses the resource values of a class I site, pollutant levels currently allowed under the class II designation may already be contributing to a deterioration

of the monument's sensitive ecosystems and wilderness attributes. Visibility impairment and adverse impacts on air quality are expected to increase as urbanization and agricultural development expand in the Sonoyta Valley. Other factors that may pose a threat to the monument's air quality include emissions from vehicles, particularly large diesel semitrailers on Mexican highways just south of the border, as well as from a smelter located approximately 175 miles to the southeast in Cananea, Sonora, Mexico.

### **WATER RESOURCES**

Surface water resources at Organ Pipe Cactus NM are limited. Water availability varies seasonally with the majority of rainfall occurring in late summer as geographically isolated thunderstorms or in winter as widespread, regional storms. These storms typically produce brief ephemeral flows that quickly infiltrate streambeds; only rarely is there sufficient runoff to cause flooding in the normally dry washes. All of the major watersheds within Organ Pipe Cactus NM flow in a westerly direction, either northwest to the Gila River, or southwest to the Gulf of California. No perennial (permanent) rivers or streams exist within the monument.

An inventory of the monument's water resources conducted in 1981 and 1982 identified 84 water sources, 48 of these containing water on a perennial or seasonal basis (Brown et al. 1983). Of these 48 sites, 11 (23%) are built and 6 (13%) have been improved or developed to some extent. Perennial water sources occur at an average density of 1 per 40 square miles. Although losses in natural water sources have occurred during this century, there has been a concomitant increase in water availability to wildlife due to the creation of artificial sources. In some cases, these developments have caused a loss or reduction of associated riparian habitats, or have reduced the retention and yield capabilities of the water source.

Tinajas and springs account for nearly all of the surface water resources within the monument. Tinajas, which are natural depressions in the bedrock, are the most abundant source of surface water. Of the 60 tinajas identified

within the monument, most occur within the Ajo, Bates, Diablo and Puerto Blanco mountains. These rock catchments serve as important seasonal water sources for wildlife. Although water quality data are scant for all but a few of the monument's water resources, tinajas may be particularly vulnerable to airborne contaminants transported regionally or locally.

Of the 11 known monument springs, eight are located at or near Quitobaquito, two are located in the Ajo Mountains, and one is located in the Puerto Blanco Mountains. Only four of these springs are perennial, three of which occur in the Quitobaquito area, and the fourth in the Puerto Blanco Mountains. Quitobaquito, the only spring with a flow sufficient to create a large body of open water, discharges at a nearly constant rate of 30–35 gallons/minute (Brown et al. 1983). The pond and associated dam, which were both constructed in 1860, form one of the largest oases in the Sonoran Desert and is second only to Quitovac, located approximately 30 miles to the southeast in Sonora, Mexico.

Channels divert water from the two largest perennial springs to the pond. The pond, which measures 200 feet wide by 260 feet long, averages approximately 5 feet in depth. This water body provides the only known habitat for the endangered Quitobaquito desert pupfish (*Cyprinodon macularius eremus*) as well as habitat for the Sonoran mud turtle (*Kinosternon sonoriense*) and numerous species of birds and invertebrates.

Existing information on ground and surface water resources for the monument includes mapped locations of tinajas, springs, and wells; over 12 years of depth-to-water data for wells; and data and locations for 17 sites where rainfall is measured. Locations and depth-to-water data also exist for 165 wells situated outside the monument in the Sonoita Valley. Because the full extent of the regional aquifer is unknown, ongoing research is focusing on defining its boundaries and capacity as well as its depletion and recharge rates.

Accelerated groundwater pumping in the Sonoita Valley due to urbanization and agricultural development poses the greatest threat to the monument's water resources. As of

1988, there were 165 wells supporting approximately 22,500 irrigated acres in the valley. Since agricultural pumping and irrigation commenced in the area roughly 20 years ago, the groundwater table within the monument has dropped by about ten feet. Consequently, a moratorium exists on the drilling of new wells even though present wells are pumping at less than half their potential capacity of 191,000 acre feet. At 83,000 acre feet per year, the annual pumping rate is two and a half times the aquifer recharge rate (Brown 1991). Pumping at current or elevated rates may lower the groundwater table, create land subsidence, alter flow regimes, threaten riparian communities, and reduce the hydrostatic pressure at monument springs, including those at Quitobaquito.

A water resources management plan, which serves as an action plan for effectively dealing with the monument's water resource issues, was completed in 1992. Project statements included in this plan have also been incorporated into the monument's recent NCRMP (1994).

## FLOODPLAINS

The NPS Floodplain Management Guideline (1993) provides agency-specific guidance for implementing Executive Order 11988 (Floodplain Management). The guideline reiterates the NPS policy of preserving floodplain values, minimizing potentially hazardous conditions associated with flooding, and adhering to all federal laws and regulations related to activities in flood-prone areas.

According to the guideline, the action class and applicable regulatory floodplain must be identified for a proposed action that is either subject to possible harm from flooding or has the potential for adverse floodplain impacts. All actions proposed within the General Management Plan (GMP) that meet this criteria are within the Twin Peaks development zone.

The NPS Water Resources Division provided assistance in identifying the extent of the 100-year, 500-year, and probable maximum

## Affected Environments

flood events<sup>1</sup>, as well as providing flood hydrology information and hydraulic modeling for floodplains in the visitor center and campground area. Survey and base mapping of the regulatory floodplains was performed by the NPS Denver Service Center. Class III actions<sup>2</sup> were identified for areas in proximity to washes that extend immediately west of the visitor center complex (Twin Peaks wash) and campground (Campground wash). The regulatory floodplains for the Twin Peaks wash were mapped from near the site of the old visitor center to a point approximately 300 yards upstream of the present visitor center; likewise, campground wash was mapped from the amphitheater to a point approximately 0.25 mile above the group campsite. The approximate drainage areas for Twin Peaks wash and campground wash are 5 square miles and 0.5 square miles, respectively. Both of these channels are dry at all times except following significant rainfall events; however, each has sufficient drainage area to produce sudden flash-flooding of low-lying areas (Smillie 1991). The limits of the extreme flood event (probable maximum flood) floodplain is identified on the Twin Peaks DCP illustrations.

## WETLANDS

Wetlands are rare within Organ Pipe Cactus NM. Those that do exist are limited to perennial water sources such as the pond and springs at Quitobaquito and, to a lesser extent, springs, water developments, and tinajas. These areas serve as important water sources for wildlife and as habitat for several of the monument's rare aquatic species. The majority of the monument's wetlands have been mapped

---

<sup>1</sup>100-year flood : a flood that has a 1% chance of occurring in any given year; 500-year flood: a flood that has a 0.2% chance of occurring in any given year; probable maximum flood: that flood considered to be the largest in magnitude possible for a site.

<sup>2</sup>Class III actions include locating or constructing buildings or facilities in high hazard areas and areas subject to flash flooding. Such facilities include administration and maintenance buildings, visitor centers, and residences which, by their nature, entice or require individuals to occupy the site, or where irreplaceable records or artifacts may be stored.

by the U.S. Fish and Wildlife Service (USFWS) from aerial photos and subsequently verified in the field.

## WILDLIFE

### Mammals

The variety of habitats represented within the monument contributes significantly to its faunal diversity. Of the 55 mammalian species known to occur within Organ Pipe Cactus NM, most are nocturnal, and many hibernate during the winter months (November–March). Included in this assemblage are 19 rodents, 13 carnivores, 14 bats, 5 ungulates, 3 rabbits and hares, and 1 insectivore; 9 additional species, most of which are bats, are suspected to occur (Petryszyn 1991). Among the most common species are the coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), white-throated woodrat (*Neotoma albigula*), and Merriam's kangaroo rat (*Dipodomys merriami*), as well as a variety of squirrels (Harris' antelope squirrel [*Ammospermophilus harrisi*], round-tailed ground squirrel [*Citellus tereticaudus*], rock squirrel [*C. variegatus*]), mice (Arizona pocket mouse [*Perognathus amplius*], desert pocket mouse [*P. penicillatus*], rock pocket mouse [*P. intermedius*], cactus mouse [*Peromyscus eremicus*]), and bats (California leaf-nosed bat [*Macrotus californicus*], California myotis [*Myotis californicus*], pallid bat [*Antrozous pallidus*], big brown bat [*Eptesicus fuscus*], and western pipistrelle [*Pipistrellus hesperus*]). Major predators include the mountain lion (*Felis concolor*), bobcat (*Lynx rufus*), coyote, gray fox, and badger (*Taxidea taxus*). Five ungulates (hoofed mammals) are also represented in the monument's fauna and include the desert mule deer (*Odocoileus hemionus crooki*), collared peccary (*Dicotyles tajacu*), desert bighorn (*Ovis canadensis mexicana*), Sonoran pronghorn (*Antilocapra americana sonoriensis*), and Coues white-tailed deer (*Odocoileus virginianus couesi*) (Southwest Parks and Monuments Association 1985).

The first formal attempt to describe the monument's fauna was in 1939 by Lawrence M. Huey of the San Diego Society of Natural History (Huey 1942). Since then, other detailed

studies have been conducted, with most focusing on individual species (e.g., bighorn sheep, white-tailed deer) or groups of species (e.g., rodents, bats). The most recent comprehensive evaluation of the monument's mammalian fauna was conducted by Cockrum and Petryszyn (1986).

### Birds

The monument's assortment of vegetation communities, encompassing desertscrub, riparian, woodland, and marsh habitats, adds markedly to its avian diversity. Other contributing factors include the presence of surface water, and the monument's proximity to a major migration route along the Gulf of California. Together these factors account for the large number of vagrant and migratory birds documented at Organ Pipe Cactus NM.

Of the 277 reported species (Groschupf et al. 1988), 58 are probable breeders and include 36 permanent residents and 22 summer residents. The remaining species are either spring and fall migrants (60 species), vagrants (50 species), or winter visitors.

Surface water can attract thousands of birds daily during the driest periods of the year. Among those species most strongly drawn to open water are mourning doves (*Zenaida macroura*), white-winged doves (*Z. asiatica*), Gambel's quail (*Callipepla gambelii*), and house finches (*Carpodacus purpureus*). The open water habitat and lush riparian vegetation at Quitobaquito Pond make it among the best known locations in southwestern Arizona for observing a diversity of avifauna, including characteristic desert and riparian species, as well as migrants and vagrants.

For more than 50 years, the NPS has kept records on the occurrence and distribution of avian species within the monument. These sightings, made by NPS personnel, researchers, and visitors, are part of the monument's wildlife observation file. The Audubon Christmas Bird Count, held annually at Lukeville since 1965, is a valuable source of information on the relative densities of wintering birds in the monument. This information is published yearly in Field Notes (formerly American Birds). The National Breeding Bird Survey, conducted each spring since 1975, provides data on breeding

bird densities along the road between Lukeville and Quitobaquito. Since 1981, this survey has been performed by personnel from the Cooperative Park Studies Unit at the University of Arizona. A comprehensive checklist describing the diversity, seasonal occurrence, and habitat preferences of monument birds has also been prepared by Groschupf et al. (1987, 1988).

In recent decades the monument's avifauna has experienced minor changes, largely due to habitat modification of adjacent lands and species expanding their ranges. The large-scale loss of riparian habitat throughout the region may be responsible for subtle changes in the status or abundance of some monument species, particularly those dependent upon marsh and open water habitats. Of the ten species that have colonized Organ Pipe Cactus NM since the early 1900s, the rock dove (*Columba livia*), European starling (*Sturnus vulgaris*), and house sparrow (*Passer domesticus*) are all non-native species that have become common permanent residents in the monument's developed areas. Agriculture and urban development in the Sonoyta Valley have also aided the range extension of the native black vulture (*Coragyps atratus*), Inca dove (*Columbina inca*), great-tailed grackle (*Quiscalus mexicanus*), and bronzed cowbird (*Molothrus aeneus*). The Inca dove and great-tailed grackle are transient visitors to the monument. The bronzed cowbird is a common summer resident of riparian and developed areas, and the black vulture is a common permanent resident, regularly seen along the international boundary near Lukeville. Both these species are known to breed within the monument; the great-tailed grackle and Inca dove may breed in nearby Sonoyta or along the Sonoyta River. In contrast to the above mentioned species, the causes behind the range extensions of the native Anna's hummingbird (*Calypte anna*), varied bunting (*Passerina versicolor*), and Indigo bunting (*P. cyanea*) appear to be natural. The Anna's hummingbird is an uncommon winter visitor to the monument, and the Indigo bunting, a rare spring transient. The varied bunting, a rare summer resident that may breed in the monument, is found in riparian, desertscrub, and mixed mountain scrub habitats (Groschupf et al. 1988).

## Herpetofauna

Organ Pipe Cactus NM's diverse herpetofauna includes 25 snake species (representing 17 genera in 4 families), 16 lizards (12 genera in 3 families), 5 toads (2 genera in 2 families), and 2 turtles (2 genera in 2 families). Represented in this assemblage are obligate desert species, riparian species, and species with broad ecological distributions that include non-desert habitats. The majority of these species have descended from ancestors of thornscrub and thornforest communities to the south, a small number have their evolutionary origins in more northerly grassland and woodland communities (Lowe and Rosen 1992).

Snakes are a conspicuous component of the monument's herpetofauna during most of the year. Organ Pipe Cactus NM's diverse assemblage of snake species appears to be healthy; many are abundant and widely distributed across a variety of habitats. Presumably the most significant predators of small rodents and lizards, their effect on prey populations is influential enough to produce intra- and interspecific competition among monument predators (Lowe and Rosen 1992).

Although still widespread and abundant within the monument, the following species have experienced significant population declines at Organ Pipe Cactus NM over the last 50 years: spotted leaf-nosed snake (*Phyllorhynchus decurtatus*), saddled leaf-nosed snake (*P. browni*), glossy snake (*Arizona elegans*), and sidewinder (*Crotalus cerastes*) (Lowe and Rosen 1992). Roads, particularly if paved, can negatively impact snake populations. At Organ Pipe Cactus NM, snake mortality has been especially severe along State Route 85. Over a four-year period (1987-1991), an estimated 2,383 snakes were killed along this stretch of road, although actual numbers may be closer to 4,000 (Rosen and Lowe 1994). Based on a conservative estimate of 500 snakes killed per year, there have been at least 39,000 snakes killed on this roadway since the monument was established in 1937. Two species that have suffered significant highway mortality are the Mexican rosy boa (*Lichamura trivirgata*) and the Organ Pipe shovel-nosed snake (*Chionactis palarostris*). Both species are also targeted by collectors, as is the tiger rattlesnake (*Crotalus tigris*).

Lizards, which are pervasive throughout the monument, are important prey for several snake species. Most are insectivorous; consequently, they may serve as important regulators of secondary production. At Organ Pipe Cactus NM, the lizard assemblage is diverse and populations appear to be healthy. Although poaching and highway mortality have a considerable effect on lizard numbers, each is currently too low to pose a threat to monument populations (Lowe and Rosen 1992).

Four of the monument's five toad species (Couch's spadefoot toad [*Scaphiopus couchi*], Colorado River toad [*Bufo alvarius*], Great Plains toad [*B. cognatus*], and red-spotted toad [*B. punctatus*]) are abundant and breed successfully within Organ Pipe Cactus NM. The majority of breeding areas are surface water sites that have been human-made or modified. These altered habitats are responsible for enhanced or expanded toad populations. Toads also breed successfully in smaller numbers at naturally occurring tinajas and springs throughout the monument.

Of the two turtles represented in the monument's herpetofauna, the Sonoran mud turtle population at Quitobaquito is declining and may face extirpation due to low hatchling and juvenile survivorship and poor recruitment of adult females. Quitobaquito contains the monument's only known population of this aquatic reptile which is an uncommon resident of desert lowlands. The status of desert tortoise (*Gopherus agassizi*) populations within the monument is less well known, although this species is declining throughout much of its range. Past and current land use practices including grazing, surface water withdrawal, road construction, and backcountry use have impacted vegetation communities within the monument to varying degrees and presumably tortoise populations.

As part of the Ecological Monitoring Program, a four-year study of the monument's amphibians and reptiles was completed in 1991 by herpetologists from the University of Arizona. The project's goals were to (1) conduct an extensive survey of the monument's herpetofauna, (2) gather baseline data at study plots representing a diversity of habitat types, and (3) establish protocols for monitoring long-term health of the monument's amphibians

and reptiles (Lowe and Rosen 1992). The monument's resource management staff has since begun implementing these long-term monitoring protocols.

### Fish

The Quitobaquito desert pupfish, endemic (native) to the spring outflows and pond at Quitobaquito, is the only fish known to occur at Organ Pipe Cactus NM. Anthropogenic impacts (e.g., water pollution, groundwater depletion, introduction of non-native fish) and stochastic events (e.g., environmental perturbations, decline in habitat quality) pose a potential threat to the subspecies' survival. The pupfish is currently listed on the endangered species list. Since 1975, a monitoring program has been conducted annually to assess the population's status. Population estimates have ranged from a high of 7,294 individuals in 1975 to a low of 1,800 in 1981, with intervening years reporting a population size of 3,000–6,700 individuals. More recently, a census conducted in 1993 reported 2,305 and 4,299 fish captured in the pond during the spring and fall censuses, respectively.

Observations made during the census indicate that the population is in good condition with a healthy distribution of age and size classes. No non-native fish were discovered in either the pond or channel. (However, a 10-inch black bullhead [*Ictalurus melas*] was caught and removed from the southwest spring during a census for the Sonoran mud turtle on August 1, 1993. It is unknown whether this fish represents an isolated introduction or is part of a larger population released into the Quitobaquito system.) Because population counts appear to typically underestimate the actual number of fish present, the monitoring protocol requires a review and possible modification to ensure validity and usefulness of the data.

### Invertebrates

Organ Pipe Cactus NM has been the site of invertebrate studies for more than 50 years with most research focusing on specific taxonomic groups or specific monument locations (e.g., Quitobaquito Pond). Some of the most notable findings include the discovery of the only known U.S. population of the Mexican leaf-cutting ant (*Atta mexicana*) and the only

known U.S. breeding habitat of the giant white butterfly (*Ascia howarthi*), which is dependent on the rare desert tree caper (*Atamisquea emarginata*) for its larval food (Kingsley 1992). The monument's invertebrate fauna also includes two newly discovered snails, both of which are endemic; the Ajo Mountains snail (*Sonorella baboquivariensis cossi*) found only in the Ajo Mountains, and the Quitobaquito snail (*Tryonia quitobaquitae*) found solely in the pond and spring outflows at Quitobaquito.

Weather appears to be the most significant factor influencing invertebrate populations. In 1987, a study examining the distribution and ecology of monument invertebrates was initiated as part of the Ecological Monitoring Program. Macroinvertebrates, primarily arthropods, were collected and observed over a three year period. As a result of this effort, more than 1,000 taxa have been recorded for the monument, with most being locally rare. Nearly 450 taxa were recorded just once; only 50 were recorded more than 10 times. (Kingsley 1991)

A potentially serious management problem involves the recent arrival of the Africanized honey bee (*Apis mellifera scutellata*). In early June 1994, the first confirmed colonies of this bee were found in swarm traps near Quitobaquito and on north Puerto Blanco Drive. Given the bee's highly defensive behavior, high reproductive rates, and long-distance swarm movements, it is expected to have significant but unpredictable impacts on human safety and various aspects of plant and animal ecology (e.g., pollination, interspecific competition).

### Threatened, Endangered, and Sensitive Wildlife

Management of threatened and endangered species must be consistent with all applicable laws, regulations, and policies including the Endangered Species Act (1973), NPS Organic Act (1916), and NPS Management Policies (1988). The challenge faced by park managers is one of single species emphasis within an ecosystem management concept. At Organ Pipe Cactus NM, all monitoring programs and management actions directed at these species are coordinated with the USFWS and Arizona Game and Fish Department (AGFD). This includes preparing biological assessments for

## Affected Environments

any actions that may affect federally protected species as well as obtaining annual permits to monitor these populations. In spite of such efforts, the monument lacks a comprehensive plan providing overall management direction for threatened and endangered species within its boundaries.

According to NPS Management Policies (1988), NPS areas are required to (1) identify and promote the conservation of all federally listed endangered, threatened, and candidate species and their critical habitats within park boundaries; and (2) identify all species inhabiting or native to a NPS unit that are either state or locally listed as endangered, threatened, candidate, sensitive, rare, or declining, along with their critical habitats. These species and their critical habitats must not be adversely affected by park operations or activities external to park boundaries.

Based on information provided by the USFWS and AGFD, and supplemented by field observations, 27 threatened, endangered, and candidate wildlife species are known to occur within the monument. A full listing of these species can be found in Appendix D. These species are also discussed in the following sections.

**Mammals.** One ungulate and three species of bats are either listed or candidates for listing under the Endangered Species Act. The Sonoran pronghorn (*Antilocapra americana sonoriensis*), listed as endangered, lives in desertscrub habitats within the monument and on adjacent lands including the Cabeza Prieta National Wildlife Refuge, Barry M. Goldwater Air Force Range El Pincate Y el Gran Desierto de Altar (The Pincate and Great Desert), and possibly portions of the Tohono O'odham Reservation. A species recovery plan, first prepared by the USFWS in December 1982, has recently been revised; a draft of the revised plan was released to the public in September 1994. The monument's Chief of Resources Management represents the NPS on the interagency working group for the recovery of the Sonoran pronghorn.

Of the three bat species, only the lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*) is listed as endangered; the other two species, the California leaf-nosed bat

(*Macrotus californicus*) and Underwood's mastiff-bat (*Eumops underwoodi*) are both category 2 candidate species.

The lesser-long nosed bat is a seasonal resident, occurring within the monument between April and September. This nectar-feeding bat is an important pollinator of both organ pipe and saguaro cactus. In 1989, the largest known maternity colony in the U.S., consisting of approximately 20,000 bats, was discovered roosting in an abandoned mine adit within the monument. Through coordination with the USFWS, the NPS has instituted a monitoring program to obtain baseline data on the colony including its size, productivity, and various habitat parameters. These data have led to a better understanding of both the population and the species. A draft recovery plan for the lesser-long nosed bat has been prepared by the USFWS and was released for public review in January 1994. The plan is expected to become final in early 1995.

Both the California leaf-nosed bat and Underwood's mastiff-bat are year-round residents. The California leaf-nosed bat is a common bat at Organ Pipe Cactus NM, roosting in caves and abandoned mine adits. Because this non-hibernating bat cannot survive low temperatures for extended periods, it roosts deep within mine adits in winter. This largely insectivorous bat probably forages within a few miles of its day roosts; rarely does it occur in open areas far from the mountains.

Little is known about the life history of Underwood's mastiff-bat. At Organ Pipe Cactus NM, this insectivorous bat is known only from Quitobaquito Pond. Although no roosts have been located within the monument, based on habitat preferences of the related western mastiff-bat (*Eumops perotis*), this bat probably roosts high on steep cliffs in rock crevices. Like the California leaf-nosed bat, Underwood's mastiff-bat requires surface water.

**Birds.** Of the 17 threatened or endangered birds reported for the monument (Table 4 in Appendix D), only two are resident species. The loggerhead shrike (*Lanius ludovicianus*) is a rare summer and common winter resident found throughout the monument, particularly in desertscrub habitat. The cactus ferruginous

pygmy-owl (*Glaucidium brasilianum cactorum*) is an uncommon permanent resident that occurs in washes, canyons, and saguaro stands; it typically nests in riparian areas during June and July. The last recorded observation of this owl within the monument was during censusing in 1990 (Organ Pipe Cactus NM, unpubl. data). The cause for the ferruginous pygmy-owl's decline at Organ Pipe Cactus NM and throughout the northern part of its range is unknown. However, the ongoing destruction of riparian habitat across the region may partially explain the reasons behind the decline. Both the loggerhead shrike and cactus ferruginous pygmy-owl are candidates for federal listing under the Endangered Species Act.

Among the five accipiters and falcons on the monument's list of threatened and endangered species, four (American peregrine falcon [*Falco peregrinus anatum*], osprey [*Pandion haliaetus*], common black-hawk [*Buteogallus anthracinus*], and crested caracara [*Polyborus plancus*]) are rare transients<sup>3</sup>; only the ferruginous hawk (*Buteo regalis*) is a casual visitor<sup>4</sup> to Organ Pipe Cactus NM.

Most reports of transient and casual visitors are from Quitobaquito Pond, perennial springs, the headquarters area, and park roads. The peregrine falcon has been observed most often in the Ajo Mountains, where it presumably nested in the past. It is also a rare winter visitor. Ospreys have been sighted at Quitobaquito, Burro Spring, William's Spring, and along State Route 85, and the common black-hawk at Quitobaquito, Aquajita Spring, and Puerto Blanco Drive. The crested caracara, a sporadic year-round visitor, has been observed most frequently near the visitor center, campground, Aguajita Spring, Quitobaquito, and Ajo Mountain Drive. The ferruginous hawk has been recorded on only four occasions, the last time in February 1982.

<sup>3</sup>Rare: very low probability of encountering the species, but not out of its normal range; transient: migrates through the region during spring and/or fall; may also include summer and winter visitors, and post-nesting wanderers.

<sup>4</sup>Casual: a short distance from the species' normal range, possibly to be expected again.

Nearly all sightings have been along State Route 85 (Groschupf et al. 1988).

Transient visitors to the monument also include the great egret (*Casmerodius albus*), snowy egret (*Egretta thula*), willow flycatcher (*Empidonax traillii*), and white-faced ibis (*Plegadis chihi*). The great egret and willow flycatcher are rare spring and irregular fall transients. Individuals and small flocks of great egrets have been reported at open water or flying over the monument. The willow flycatcher was last sighted in August 1981 at Quitobaquito. The snowy egret and white-faced ibis, both uncommon transients, have been observed most often at open water; small flocks of the snowy egret have been reported at Quitobaquito and the monument's sewage lagoon, whereas nearly all sightings of the white-faced ibis have been at Quitobaquito (Groschupf et al. 1988).

Other threatened and endangered species that are casual visitors to Organ Pipe Cactus NM are the tropical kingbird (*Tryannus melancholicus*), brown pelican (*Pelecanus occidentalis*), least bittern (*Ixobrychus exilius*), black rail (*Laterallus jamaicensis*), and Sprague's pipit (*Anthus spragueii*). Each of these species has been recorded in the monument fewer than four times (Groschupf et al. 1988).

**Herpetofauna.** Four representatives of the monument's herpetofauna are candidates (category 2) for federal protection under the Endangered Species Act. Included are the desert tortoise, chuckwalla (*Sauromalus obesus*), canyon spotted whiptail (*Cnemidophorus burti*), and the Mexican rosy boa. The desert tortoise is of particular concern because it faces threats throughout its range. Two tortoise populations, the Mohave (California) and Beaver Dam Slope (Arizona/Utah) populations, have already been listed as endangered due to ongoing declines caused by disease and unidentified factors. Although the status of the Sonoran population is still uncertain, tortoise populations in northern Arizona and the Phoenix area are severely declining.

The chuckwalla is relatively abundant and widely distributed throughout the monument. The largest known population of the canyon spotted whiptail is in the Ajo Mountains.

## Affected Environments

Neither species has experienced human-induced population declines of major consequence. Of the four reptiles being considered for federal listing, only the rosy boa appears to be significantly impacted by highway mortality along State Route 85. This snake, on the periphery of its range at Organ Pipe Cactus NM, is rare within the monument (Lowe and Rosen 1992).

**Fish.** The Quitobaquito desert pupfish, endemic to the spring outflows and pond at Quitobaquito, is federally listed as endangered. In September 1993, the USFWS prepared a recovery plan outlining measures that would protect the existing population as well as increase the prospects for subspecies' survival. This rare pupfish has been afforded additional habitat protection by the USFWS through the designation of Quitobaquito as critical habitat.

**Invertebrates.** The Quitobaquito snail is the only monument invertebrate being considered for listing under the Endangered Species Act. This snail, endemic to the pond and spring outflows at Quitobaquito is a category 2 candidate species. The cryptic nature and small size of this mollusk hinders the development of an effective monitoring program. Detailed knowledge of the basic biology of the species is required to support its listing as either endangered or threatened.

### Wildlife Species of Special Concern

In addition to those wildlife species afforded enhanced protection under the Endangered Species Act (Table 4 in Appendix D), other monument species are of special concern because they are (1) locally rare, (2) of interest to poachers, or (3) their population status within the monument is unknown. Locally rare species include those experiencing specific negative impacts (e.g., highway mortality for the Organ Pipe shovel-nosed snake), long-term declines (e.g., spotted leaf-nosed snake) or low, unstable population sizes (e.g., Sonoran mud turtle), and species at the edge of their range or restricted in distribution.

The high value of many species on the black market makes the monument a prime target for poachers. Among its wildlife species, the herpetofauna faces perhaps the greatest threat. Reptiles of particular interest to poachers

include all snake species as well as the Gila monster (*Heloderma suspectum*) and desert tortoise. Because poaching has the potential to adversely affect monument population levels, biodiversity, and species interrelationships, information is needed to determine the extent of the problem and assess its impact on monument resources.

Among those species whose population status within the monument is unknown are the desert bighorn sheep, collared peccary, mountain lion, and desert mule deer. Baseline data are needed to determine each species' habitat use, population size, density, and distribution throughout the monument, as well as the identification of potential threats. Such data are necessary for establishing long-term monitoring protocols that can assist the NPS in undertaking well-informed and effective management actions when necessary.

## VEGETATION

Botanical surveys have identified 574 vascular species within the monument, representing 325 genera and 87 families of both perennial and annual plants (Bowers 1980, Pinkava et al. 1991). Approximately 64 species (11%) are non-native (Felger 1990). Organ Pipe Cactus NM owes its botanical diversity to a combination of topography, geography, and environmental gradients (e.g., rainfall, temperature, soil characteristics). The Ajo Mountains, one of the highest mountain ranges within the region, contains a variety of habitats including relict populations of chaparral and woodland species. The monument's location in roughly the geographic center of the Sonoran Desert is a place where three subdivisions of the Sonoran Desert intergrade. This ecotone contributes to the diversity of desertscrub vegetation, accounting for approximately 95% of the monument's area (Warren et al. 1981). Only in riparian areas and at higher elevations can more mesic vegetation be found.

A vegetation survey conducted by Warren et al. (1981) identified 29 vegetation associations in the monument. All but five are desertscrub associations belonging to two major subdivisions of the Sonoran Desert. Represented within the Arizona Upland subdivision are vegetation associations within

the paloverde-mixed cacti series; associations within the creosotebush-bursage series belong to the Lower Colorado subdivision. A few desertscrub species including the organ pipe cactus (*Stenocereus thurberi*), senita (*Lophocereus schottii*), limberbush (*Jatropha cardiophylla*), and elephant-tree (*Bursera microphylla*) are representative of a third subdivision, the Central Gulf Coast, and occur on warm, rocky hillsides intermixed with the paloverde-mixed cacti associations. Many of these species which are more characteristic of subtropical and tropical habitats, reach their northern distributional limits in the monument (Warren et al. 1981).

Although there are at least 29 vegetation associations within the monument, only five habitat types are represented. These include mixed Sonoran desertscrub, creosotebush-bursage, evergreen woodland/mesic evergreen scrubland, marsh and open water, and riparian communities (Groschupf et al. 1988).

#### Mixed Sonoran Desertscrub

Desertscrub vegetation is the primary ground cover in the monument. Within this plant community, paloverde-mixed cacti associations dominate the landscape and are characteristic of the lower mountain slopes and bajadas where coarse soil texture and higher amounts of rainfall provide greater moisture for plants. Prominent desertscrub species include paloverde (*Cercidium* spp.), organ pipe (*Stenocereus thurberi*) and saguaro (*Carnegiea gigantea*) cactus, ocotillo (*Fouquieria splendens*), bursage (*Ambrosia* spp.), and brittlebush (*Encelia farinosa*). Small amounts of creosotebush (*Larrea tridentata*) are typically interspersed among the mixed cacti vegetation. Saltbush (*Atriplex* spp.) is prevalent at the monument's southern boundary where heavy, silty, and saline soils occur.

#### Creosotebush-Bursage

The creosotebush-bursage community best characterizes the Lower Colorado subdivision of the Sonoran Desert. Dominant plants include creosotebush, triangle-leaf bursage (*Ambrosia deltoidea*), and white bursage (*A. dumosa*). Other associated plants include paloverde, cacti, and seasonal grasses. This community is

predominant in valley bottoms where fine textured soils are found on nearly level terrain. It is well represented in the western section of the monument and in portions of the Valley of the Ajo where nearly pure stands of creosotebush cover large areas.

#### Evergreen Woodland/Mesic Evergreen Scrubland

Evergreen woodland and mesic evergreen scrubland communities are restricted to protected areas of the Ajo Mountains. These communities are generally found above 3,280 feet (1,000 meters) or as low as 2,493 feet (760 meters) on shaded, north-facing slopes and at the bottom of large drainages. Evergreen woodlands are dominated by one-seed juniper (*Juniperus monosperma*) or Ajo oak (*Quercus ajoensis*). Evergreen scrubland consists of chaparral and desertscrub species typical of the higher desertscrub associations and is characterized by jojoba (*Simmondsia chinensis*), gooseberry (*Ribes quercetorum*), hoptree (*Ptelea trifoliata*), and holly-leaf buckthorn (*Rhamnus crocea*). Evergreen scrubland, the most mesic non-riparian vegetation in the monument, is more limited in its distribution than the evergreen woodland community.

#### Marsh and Open Water

Marsh and open water habitat is scarce within the monument. This habitat type is restricted to areas of standing water such as springs, water developments, and tinajas. Emergent vegetation is common and typically includes cattails (*Typha* spp.) or bulrush (*Scirpus olneyi*). The best example of this habitat type is at Quitobaquito. The Quitobaquito area, which accounts for only 3.5% of the monument, represents approximately 45% (271 species) of its flora. Thirty-five of these plants are wetland species.

#### Riparian

Narrow belts of riparian vegetation are widely distributed along dry washes and arroyos throughout the monument. Compared with adjacent upland habitats, washes offer increased water availability to vegetation on either a seasonal or continuous basis. Only in three large washes (Growler Wash near Bates Well,

## Affected Environments

Kuajatch Wash near Wall's Well, and near Aguajita Springs), is the vegetation sufficiently developed to be labeled riparian woodland. These areas, ranging in elevation from 1,200 to 2,100 feet, possess shallow groundwater and silty, floodplain soils. Characteristic species include mesquite (*Prosopis glandulosa*), blue paloverde (*Cercidium floridum*), canyon ragweed (*Ambrosia ambrosioides*), gray-thorn (*Ziziphus obtusifolia*), and catclaw acacia (*Acacia greggii*). Because canopy shading tends to reduce the shrub understory, riparian woodlands exhibit very open tree stands that are typically 15–20 feet tall and form a continuous corridor along the wash (Warren et al. 1981).

At Quitobaquito, where surface water is available year-round, a more developed riparian habitat exists. Here, cottonwoods (*Populus fremontii*) provide an overstory canopy and large mesquites, a dense understory.

Riparian vegetation experiences the greatest local variation in species composition along small and medium-sized drainages of the upper bajada. Species representative of adjacent vegetation types are frequently associated with the riparian community. Lining the open, sandy, wash channels are small trees and dense shrub thickets. Dominant species include canyon ragweed, ironwood (*Olneya tesota*), foothill paloverde (*Cercidium microphyllum*), creosotebush, catclaw acacia, and wolfberry (*Lycium* spp.).

Along broad, sandy washes on the lower bajada, such as Cuerda de Leña and Cherioni Wash, the riparian community is less diverse. Here characteristic flora includes blue paloverde, mesquite, canyon ragweed, burro-brush (*Hymenoclea salsola*), and wolfberry. This vegetation type is restricted to only a few locations, on nearly level terrain, in Growler Valley and the Valley of the Ajo (Warren et al. 1981).

### Non-native Vegetation

The low percentage (11%) of non-native species reflected in the monument's flora is indicative of a healthy habitat (Felger 1990). However, this figure is misleading and may actually be lower than reported since some non-native species (1) may actually be native, (2) are no longer present, (3) are not capable of

reproducing or propagating, and (4) are undocumented in the monument despite occurring on adjacent lands. Just over half of all non-native species have been documented at Quitobaquito Springs, indicative of the major vegetation changes that have occurred at this location due to human influence.

Most non-native plants are colonizing species that occur in disturbed habitats, such as roadsides and developed areas, and pose little threat to native flora. However, several invasive species have become well-established in natural habitats and are a cause for considerable concern and immediate management attention. These include foxtail brome (*Bromus rubens*), Lehmann lovegrass (*Eragrostis lehmanniana*), buffleggrass (*Pennisetum ciliare*), and fountain grass (*P. setaceum*). Perhaps the most insidious source of invasive, non-native grasses are rangelands adjacent to the monument where these species have been purposely introduced as livestock forage by the U.S. Department of Agriculture's Natural Resources Conservation Service (Felger 1990).

### Threatened and Endangered Plants

Two species of plants possessing limited distributions within the monument are candidates for protection under the Endangered Species Act (Table 2 in Appendix C). The Trelease agave (*Agave schottii* var. *treleasei*) is known only from Bull Pasture in the Ajo Mountains. This population contains 19 clones with 1–50 plants per clone. The acuña cactus (*Echinomastus erectocentrus* var. *acuenensis*), which is at its western range limit within the monument, is found only in Acuña Basin where it is unevenly distributed and locally abundant. Although scattered individuals occur in northern Sonora, only two other populations are known in Arizona (Johnson et al. 1991). The restricted distributions of both species at Organ Pipe Cactus NM makes each population vulnerable to extirpation (localized extinction) by external influences and stochastic (chance) events.

### Plant Species of Special Concern

Many species of native flora are of particular concern because they are locally rare or are of interest to poachers and collectors. The

monument's wealth of native flora coupled with its proximity to Mexico and the high value of some species on the black market makes Organ Pipe Cactus NM a prime target for poachers. Cacti of greatest interest include the saguaro, organ pipe, senita, acuña, barrel (*Ferocactus* spp.), and dahlia-rooted cereus (*Cereus striata*). Other native species of value on the black market include shrubs, trees, and succulents that are either rare or are desirable for landscaping. Poaching of locally rare species may not only result in a loss to the monument's botanical diversity, but also have an adverse effect on its biotic relationships.

Recognizing the uniqueness and desirability of its desert flora, Arizona revised its native plant

law in 1990. The law's purpose is to protect Arizona's wild-growing native plants from theft and vandalism through an active public education and enforcement program (Arizona Department of Agriculture 1993). The Arizona Native Plant Law provides additional legal protection for the monument's flora.

A review of the monument's list of rare and sensitive plant species was recently conducted by Johnson et al. (1991). Based on information gathered from the field and botanists familiar with its flora, 27 species within Organ Pipe Cactus NM have been identified as either rare or sensitive (Table 3 in Appendix C).

# THE CULTURAL ENVIRONMENT

## OVERVIEW

The geologic and biologic diversity of the Organ Pipe Cactus NM area provided resources for early human subsistence. Human occupation began some 12,000 years ago, in the Pleistocene period. Paleo-Indian groups were present and the climate was colder and wetter than today, supporting a pine-juniper forest. Human occupation has continued over time to show various cultural adaptations to a changing environment in the form of various patterns of living by different groups. Following the Holocene period, conditions have become increasingly hotter and drier, going from a yucca-juniper parkland type of vegetation to the appearance of saguaro cacti about 8,000 B.C.E. The desert environment as we now know it fully emerged sometime later. Settlement continued to be possible due to scarce but strategic water sources.

The park contains archeological sites dating from the Paleo-Indian period up through historic American Indian cultures, including Hohokam, Tohono O'odham (formerly known as Papago), and Hia-Ced O'odham (formerly known as Sand Papago) sites. Certain sites also reflect the activities of Spanish explorers and missionaries, Euro-American explorers and scientists, gold and silver miners, homesteaders, and cattle ranchers.

The park is archeologically, ethnographically, and historically diverse. A broad continuum of cultural resources range from springs that have been used by both prehistoric and historic people, up to more recent twentieth century mining and ranching properties. The park also contains I'toi Mo'o (Montezuma's Head), a rock formation in the Ajo Mountains sacred to the neighboring Tohono O'odham Nation. The remains of past human occupations illustrate the various patterns of living and adaptations that different groups made in response to an arid desert environment.

## PREHISTORY and ARCHEOLOGICAL RESOURCES

Recorded archeological sites and isolated artifacts document 12,000 years of occupation in the southwest Sonoran Desert. Throughout this time period, the area represents a unique history of desert adaptation and a zone of interaction between various cultural groups.

The earliest evidence for human occupation dates to the Paleoindian period, ca. 12,000-8500 B.C.E. This transitional late-Pleistocene early-Holocene culture was represented by two flaked stone tool traditions: Clovis and San Dieguito. The earlier Clovis tradition was distinguished by well-made, lanceolate and fluted projectile points with concave bases that were hafted on spears. Faunal remains at Clovis sites indicate hunting of big-game, such as mammoth, that became extinct at the end of the Pleistocene. The subsequent San Dieguito I was characterized by crude scraping and chopping tools but commonly lacks projectile points. This suggests a shift in subsistence toward increased foraging. Dr. Bernard Fontana and archeologist Julian Hayden have stated that a San Dieguito site was bulldozed during the removal of buildings and clean-up of Quitobaquito in the 1960s.

Clovis sites containing mammoth remains and stone tools are known primarily from southeastern Arizona and are rare in southwestern Arizona. A Clovis projectile point (Ezell 1954) was recovered on the surface of the Growler Valley near the boundary of the Cabeza Prieta National Wildlife Refuge and the monument. In 1993, an extinct cienega or marsh was identified when deposits of cienega soils were observed. It is surrounded by Paleoindian period tools that are eroding out of the banks of the lower bajada slope overlooking the basin. It is not known whether the cienega or marsh was one large entity that subsequently retracted or whether the cienega shifted locations. Mammoth remains and prehistoric stone tools have been recovered in a similar setting at Quitovac, Sonora, Mexico only 35 miles southeast of the monument. It is highly

probable that buried deposits in the extinct cienega within the Organ Pipe Cactus NM contain extinct mammoth and evidence of Paleoindian occupation.

The Southwestern Archaic, 8500 B.C.E.–C.E. (Common Era). 300, was a widespread post-Pleistocene hunting-gathering adaptation. The climate became warmer and drier and the Sonoran desert was established. By 2000 B.C.E. the desert as we know it had evolved. During this time, small, autonomous groups with defined territories, were seasonally mobile. They exploited a wide variety of wild plants and small game, and had grinding tools. However, they shared contact and boundaries with other groups through a series of marriage networks that united them into a recognizable culture—the Southwestern Archaic. This resulted in the widespread use of projectile points and ground stone tools.

The Southwestern Archaic is divided into three periods distinguished by a distinctive artifact inventory and projectile point styles that changed over time: Early (8500 B.C.E.–5000 B.C.E.), Middle (5000 B.C.E.–1500 B.C.E.), and Late (1500 B.C.E.–C.E. 300) (Huckell 1984). Sites of each time period are represented by surface artifact scatters and by stratified deposits in rockshelters. The spatial distribution of projectile point styles suggests that different groups occupied specific territories, and that there was contact between each group. Sites in the eastern portion of the monument contain styles associated with the Cochise culture. Projectile point styles in the western portion of the monument suggest an *Amargosa* affiliation. Transitional types occur in both areas.

Surface scatters of stone artifacts and chipping debris without ceramics were first used during the Archaic period and continued in use until historic times. These sites are relatively common in the monument. They contain scatters of chipped stone tools, waste debris from manufacturing, roasting pits, and occasionally sleeping circles or cleared areas. The artifacts may be embedded in the surface or resting on top. Artifacts embedded in the surface have been used by geologists to date the age of certain land forms in the monument. The sites reflect use as base camps, stone tool manufacturing locations, hunting blinds, and

plant gathering and preparation locations. Quarries and prehistoric trails are distinctive categories of surface sites. Archaic period rock art sites have also been identified in locations throughout the monument.

Stratified Archaic period deposits have been identified in a number of rockshelters. Rockshelters and rock niches occur in all of the mountain ranges in the monument. Rockshelters contain a wealth of data on the prehistoric environment in addition to information on prehistoric people. An ancient packrat midden in a rockshelter yielded juniper seeds around the time of the Early Archaic, thus providing important information about climatic change through time. One rockshelter was recently recorded because of flood damage to the interior. These sites are threatened by natural forces and human disturbance.

The prehistoric ceramic period, C.E. 300–1450, is represented primarily by the Hohokam culture. Interaction with the Patayan culture of the lower Colorado River region and with the Trincheras culture of northern Sonora, Mexico is indicated by the presence of diagnostic artifacts at Hohokam sites and as isolated artifacts. Recent archeological models depict the Hohokam as a system of interacting but geographically distinct communities that were economically related through exchange.

Organ Pipe Cactus NM was not a core area of the Hohokam, but is considered to be a peripheral area known as *Papagueria*. The data from recent surveys in the monument indicate that the earliest recorded use of the monument area by the Hohokam occurred during the Colonial period, C.E. 775–975. That evidence consists of isolated red-on-buff potsherds from the Phoenix basin. These ceramics have usually been found along the trails that connect the desert to the Sea of Cortez, suggesting that Hohokam peoples from the Phoenix basin, or at least their ware, were passing through the monument area along trade routes.

The following Sedentary period, C.E. 975–1150, was characterized by expansion of Hohokam populations into the monument area. Small seasonally occupied sites associated with shell artifact manufacturing were recorded near trail heads of travel corridors between the desert and the sea. Small villages were established in

## *Affected Environments*

the valleys. The villages had red-on-buff pottery indicating either interaction or a political alliance with the Phoenix basin. Toward the end of the Sedentary period small amounts of pottery from the Tucson basin, the Trincheras culture area in northwestern Sonora, Mexico and from the Lower Colorado, appeared, suggesting wider-spread associations.

The Classic period, C.E. 1150–1400 marked a radical reorganization throughout the Hohokam regional system. The peripheral areas to the north and east of the Phoenix basin were abandoned and the Tucson basin emerged as a second core area.

Major changes in Hohokam settlement in the monument occurred during the Classic period. The majority of the Hohokam sites recorded from this time period to date indicates continued expansion or growth of populations in western Papagueria. Hohokam sites associated with plant and animal procurement, processing, and preparation were identified on the bajadas for the first time. The independence of people in the monument area from the core group in the Tucson area is indicated by the 1) persistence of pithouse architecture at a time when the core groups had abandoned them, 2) the absence of platform mounds and compounds common in core areas, and 3) the increasingly common occurrence of large villages with reservoirs. New villages were established and those founded during the previous Sedentary period were expanded. A vast Hohokam community, which consisted of a large reservoir-based village (in excess of 250 acres) surrounded by small villages and farmsteads, flourished. In an area where permanent water supplies were almost non-existent, reservoirs provided a stable source of water, which enabled year-round occupation. The reservoirs were actually wells that were dug to intercept the shallow groundwater table. Excavation and maintenance of reservoirs required organized labor. Although obviously independent of the Hohokam cores, these sites continued to have large amounts of shell manufacturing debris and obsidian, which suggests that these items continued to be important in trade.

Changes in political alliances and/or trading networks are indicated at Classic period sites by

a total absence of pottery from the Phoenix basin core area and overwhelming presence of pottery identical to ceramics from Tucson Basin Hohokam sites. A new, unnamed redware pottery that was manufactured in the monument area, appeared for the first time. Patayan ceramics from Lower Colorado area and Trincheras ceramics from northern Sonora, Mexico indicate further changes in the trade and exchange network. The occurrence of Salado Polychromes in the large village sites after C.E. 1300 suggests that regional Hohokam populations also participated in the Salado Interaction Sphere, but the extent of participation is currently unknown (Crown 1994). The recently identified Post-Classic Period, C.E. 1400–1450, may also be represented at a number of these large sites.

It is no coincidence that the greatest degree of erosion occurs in areas where there are large Hohokam villages. Long-term use of these areas resulted in compaction of the soil. Coupled with abandonment of the water control systems that controlled water flow and surface erosion, vegetation-free areas permitted large-scale sheetwash erosion to occur.

The Protohistoric period, C.E. 1450–1700, represents the period of time between the collapse of the Classic period Hohokam culture and the beginning of contact with the Spanish and the first written records of indigenous people. A number of Protohistoric period sites or components of sites that were occupied during the Archaic period have been recorded in various areas of the monument. Ceramics on these sites suggest that Protohistoric period groups in the monument were either O'odham or were obtaining ceramics from the O'odham. Two of the sites contain roasting pits which have the potential to yield absolute dates as well as information concerning subsistence activities.

The continuity of human use of the monument area and constraints imposed by the scarcity of water can be felt as one walks one of many prehistoric trails. Today, hikers sometimes unknowingly use these trails to reach the backcountry wilderness. Archeological evidence along the trails indicates use since the Early Archaic, ca. 8500 B.C.E. For ancient people it was the main travel corridor between the desert and the Sea of Cortez.

## **Archeological Surveys**

The cultural component of the Sonoran Desert ecosystem in Organ Pipe Cactus NM was largely unknown until recent surveys conducted by the NPS Western Archeological and Conservation Center, (WACC). Prior to 1980, knowledge of the cultural resources was limited to data from a number of early reconnaissance surveys conducted between the late 1920s and early 1950s (Gladwin and Gladwin 1929, Ezell 1951, 1954, 1955). These early projects identified 162 archeological sites. The surveys indicated that cultural resources were present, however the longevity of human occupation, the diversity of cultural traditions present, and the intensity of occupation were largely undetermined or unrecognized. Until recently, it was thought that site density would be low because of environmental constraints. In fact, Paul Ezell's (1954, 1955) pioneering work at the monument suggested that sedentary residence was unlikely due to the lack of perennial water sources.

During the 1980s, a number of surveys were undertaken in advance of various construction projects. The majority of these projects supported the view that archeological sites were infrequent. In fact, few isolated artifacts were identified on any of these projects. An exception was found on the Ajo Crest, thought to be an unlikely place to identify cultural resources due to the rugged terrain and general absence of water resources. The survey for the construction of the boundary fence survey along the crest of the Ajo Mountains (Mallouf 1980) resulted in the identification of 46 sites. Forty of the sites were situated near or on the crest. This discovery of a large number of sites in an unlikely location led to a reevaluation of the potential for archeological sites at the monument.

In 1989 the WACC began a stratified sample survey to inventory cultural resources. The surveys were conducted in areas of both high and low probability for site location. One hundred eighty-three sites were recorded between 1989 and 1991. In 1993, the Quitobaquito basin was surveyed and sixteen sites were recorded. In 1994, a rockshelter site was recorded and a condition assessment completed after a flooding episode damaged the site. A total of 8,000 acres—only 2% of the

monument—has been surveyed, and 200 archeological sites have been recorded between 1989 and 1994.

Approximately 225 of the 246 sites recorded since 1980 are considered to be significant under criteria of the National Register of Historic Places as they have the potential to yield important scientific information. National Register nominations for two archeological districts, the Quitobaquito District and the Kuakatch Hohokam Community, have been prepared. Quitobaquito Springs, the three ranch properties, and the three mining properties discussed in the National Register section all have the potential to contribute to historical archeology.

## **HISTORY and HISTORIC RESOURCES**

Captain Melchior Diaz, of General Francisco Vásquez de Coronado's C.E. 1540–1542 expedition, is believed to have stopped at Quitobaquito Springs in 1540. He may have been the first European to visit what is now Organ Pipe Cactus NM. "The land endures much as Spanish explorer Melchior Diaz saw it in 1540, a mere half-century after the voyage of Columbus" (Broyles 1989). Diaz died on January 8, 1541, as a result of an accident on the return trek from the mouth of the Colorado River, impaling himself on his lance, and "was buried somewhere along the trail, perhaps within the present boundary of the park" (Greene 1977).

Padre Eusebio Francisco Kino noted the presence of aboriginal inhabitants at Quitobaquito in 1698 and recorded his approval of the site, calling it "a good place" (quoted in Bennett and Kunzmann 1989). In 1770, the Franciscan missionary Francisco Garces sojourned at Quitobaquito. In the fall of 1775, Bernardo de Urrea, an administrator or soldier from the Presidio of Saint Gertrude of Altar in Sonora counted a population of 27 men, 24 women, 11 boys, and 13 girls for a total of 75, all classified as converted Christian Indians (de Urrea 1775).

By the latter part of the eighteenth century, the proximity of Quitobaquito to El Camino del Diablo, the overland route to the lower Colorado River, increased Quitobaquito's

## *Affected Environments*

importance as a watering place. (The portion of El Camino del Diablo running through the Cabeza Prieta National Wildlife Refuge, just to the west of Organ Pipe Cactus NM, is listed in the National Register of Historic Places.) The springs no doubt were utilized by many of the Mexican migrants en route to California over El Camino del Diablo in the late 1840s and early 1850s. During this period, some of the Hia-Ced O'odhams took to raiding Mexican emigrants passing over the trail. Two Mexicans were killed at Quitobaquito, an incident that triggered retaliation by angry residents of Sonoyta, Mexico, who either killed or drove out most of the O'odhams. Those that remained often helped wayfarers in need by providing them with food and a place to rest.

The first Anglo contact appears to have occurred in 1854 when a railroad survey crew headed by Andrew B. Gray visited the oasis. In 1855, the first documentation of Hia-Ced O'odham people actually living at Quitobaquito was provided by Lieutenant Nathaniel Michler who was in the area with a survey party pursuant to the Gadsden Purchase. That year a separate crew of Mexican surveyors was there also.

Anglo settlement began about 1860 when Andrew Dorsey dug a pond and built an earthen dam to catch and hold the water of the springs. He settled into an adobe house, planted an orchard of pomegranate and fig trees with irrigation ditches, and established a store. He married Rita Celaya of Altar, Mexico, and a son, Remigio Andrew Dorsey was born at Quitobaquito in 1886 (Bennett and Kunzmann 1989).

Other Anglo contacts focusing upon Quitobaquito included the expeditions of William Hornaday in 1907 and Carl Lumholtz in 1909–1910. Their reports, listed in the bibliography, remain classic studies of this area of the Sonoran Desert of significance "for science" (Bennett and Kunzmann 1989) "and its storehouse of wonders" (Broyles 1988).

Throughout the last half of the 19th century and the first half of the 20th, a pattern emerged of continued O'odham habitation, increased Anglo settlement, and occasional Mexican influences. Americans at Quitobaquito included Albert Steinfeld and J. C. Waterman in the 1870s;

Mikul G. Levy, an expatriate entrepreneur who operated a store supplied from Mexico in the late 1880s and early 1890s; Thomas Childs, Jr. (1870–1951) who married an O'odham woman, Martha Garcia, with relatives at Quitobaquito and who rebuilt the irrigation ditches about 1904; and John Merrill and Reuben Daniels in the early 1900s. Both of the other men married O'odham women, too. The wife of Reuben Daniels was Viviana Orosco (Hoy 1976; Bell, et al. 1980), and John Merrill married Maria Garcia (Bell, et al 1980).

The Frenchman, José Lorenzo Sestier, who died at Quitobaquito in 1900, worked at Mikul Levy's store and was buried by him there. In the 1870s and 1880s, a Mexican family named Lopez settled at Quitobaquito and raised goats. In the early 1890s, Cipriano Ortega operated an arrastra near the pond.

Cipriano Ortega acquired what became known as the Victoria Mine in the 1880s, a mine started by other Mexicans circa 1870 in what is now the park. Mikul Levy took over the Victoria Mine in 1899 and held title until his death in 1941. He operated stores at Victoria Mine, Quitobaquito, and Aquajita Spring in what is now the park.

At about the same time the Victoria Mine was beginning, mining operations were also undertaken at the Milton Mine. Both of these mines lasted well into the twentieth century. The Growler Mine falls into this category of booming in the late nineteenth century and lasting well into the twentieth. Nearby Bates Well provided support services for the Growler operation, including water.

When explorer Carl Lumholtz visited Bates Well during a 1909–1910 trip, he said that a mine and store were there. We have no indication as to what the structures might have been like except for the existing arrastra, which seems to have been associated with small-scale gold mining and date to the period of W. B. Bates, the first Anglo settler there at the turn of the century who sold his property to Reuben Daniels circa 1912 for the latter to run cattle.

Cattle were first brought into Arizona by Don Francisco Vásquez de Coronado on his expedition north from Mexico, 1540–1542. This journey was the precursor of the trail

drive, an integral practice of the cattle industry to get the animals to market. Impetus to the actual raising of livestock in Arizona occurred late in 1696 and early in 1697 when Padre Eusebio Francisco Kino placed some cattle, sheep, goats, and horses with the Tohono O'odham (formerly Papago) Indians of Mission San Xavier del Bac and with the Sobaipuri Indians along the San Pedro River at the Quiburi Rancherias. "Thus began the cattle industry of Arizona," according to Kirk Bryan in his 1925 work on "The Papago Country, Arizona".

Concerning cattle, Reuben Daniels (1878–1926) was known to be running cattle at Bates Well in 1913, and that year is generally accepted as the time when he acquired the property from W. B. Bates. "No major cattle production by Americans in the immediate vicinity of the national monument took place until after 1912, and earlier references to cattle and horses in the Sonoita Valley largely referred to stockraising south of the international line" (Greene 1977).

Cattle and other livestock raising from the very early days on into the nineteenth century was often coupled with horticulture and agriculture. That was true of the Spanish missions to the Indians in southern Arizona of the seventeenth and eighteenth centuries, and it was characteristic of William Kirkland's 1857 operation along the Santa Cruz River at Canoa, about twenty miles north of Tubac. He is credited as being the first Anglo to take up ranching in Arizona. It was also true of Pete Kitchen's spread along the Santa Cruz in the 1860s near the present Mexican border when his outfit alone was able, with a fortified ranch house, to hold out against the constantly raiding Apaches. It was later true in the early twentieth century of the Robert Louis Gray family at Dos Lomitas Ranch. After the Apaches were subdued by the United States Army in the 1870s and 1880s following the Civil War, the presence of Anglos increased as they began to enter and settle the area obtained from Mexico through the Gadsden Purchase in 1853–1854.

With the subjection of the Apaches, mining and cattle raising, begun by the Spanish, were resumed by Anglos in southern Arizona. Railroads were a stimulus also. In various parts of the state, cattle raising had assumed the

aspects of a business enterprise by 1880, and the building of the Southern Pacific was of paramount historic importance towards that end. The Southern Pacific was the first railroad in Arizona and operated its first service there in 1877. The town of Ajo by 1916 had been linked with the Southern Pacific by the Tucson, Cornelia, and Gila Bend Railroad (Walker and Bufkin 1986:46; Dollar 1991:44). That coincided with the establishment of the New Cornelia [Copper] Mining Company at Ajo and the stimulation of the cattle industry in the vicinity of Ajo. The Ajo railroad eliminated the necessity for a long trail drive, and the developing mining community provided a local market for beef. Cattle raising by the 1920s had become a significant part of Arizona's economy along with copper mining, lumbering, sheep raising, and tourism.

The story of cattle raising in the Arizona portion of the Sonoran Desert is dominated by that of the Robert Louis Gray family. The Sonoran setting sparsely contrasts with the more lush, grassy environment of the Santa Cruz and San Pedro rivers to the east where ranching began in Arizona. Starting in 1919, Robert Louis Gray, Sr. or Bob (1875–1962) and three of his sons — Henry (1897–1976), Jack (1909–1975), and Robert, Jr. or Bobby (1912–1976), — eventually came to control as the Gray Partnership virtually all of the ranching interests in what in 1937 became Organ Pipe Cactus NM. Grazing continued in the monument by way of a series of grazing permits issued over the years by the National Park Service. The Gray ranching operation did not end until 1976 with the deaths of Henry and Bobby Gray.

The frontier–border style of the Grays was noted for its use of miscellaneous building materials at hand and for a series of ranches and line camps about a day's ride apart with wells, corrals, and trigger gates, which were used to roundup the cattle when they came in for water from the open range. According to Wilton Hoy in his 1976 compilation *Organ Pipe Cactus Historical Research*, "roundups...were...made by trapping the cattle at given water holes surrounded by a corral and a gate through which they could enter but not leave". The trigger gate was clever and representative of the Grays' distinctive pattern of cattle raising in the Sonoran Desert. The trigger gate is a very

## *Affected Environments*

distinctive feature of Sonoran Desert ranching. "Rather than riding the range to round up cattle in the traditional manner of the American West, ranchers of Northwestern Papagueria, including the Gray family, selected the hot, drought season when natural [watering] holes dried up. They ran water inside the corrals and closed them with trigger gates. So when cattle entered the corral through the V-shaped gates that pointed into the corral, barely allowing passage in, they could not exit the gates" (Hoy 1976).

What is now Organ Pipe Cactus NM witnessed agriculture (beans, corn, and melons) by way of floodwater irrigation from Kuakatch Wash from 1930 to 1935 near Armenta Well (Greene 1977). The property of Abraham Armenta survives, but the brick house and adjacent ocotillo jacal are deteriorating.

The park contains 11 international boundary markers or monuments, numbers 163 through 173, east to west. They literally stride the border with half in each country. Monument Number 1, dating back to 1855, lies on the border of New Mexico in the vicinity of El Paso, Texas and is listed in the National Register of Historic Places.

### **National Register Listed Properties**

Several remnants of properties representing significant portions of history still remain in Organ Pipe Cactus NM. Because of their significance, the following properties are currently listed or formally declared eligible for listing on the National Register of Historic Places. A description of the existing status of each property is described below. Other culturally significant properties that may at some time be evaluated for listing on the National Register are described in other sections under Cultural Resources.

**Bates Well Ranch.** Robert Louis Gray, Sr. and three sons—Henry, Jack, and Robert, Jr.—came to hold virtually all of the ranching interests in what became Organ Pipe Cactus NM. The pursuit of ranching as a primary and specialized activity was a consequence of the frontier conditions that required a great deal of ingenuity to use adaptively and creatively a combination of local and imported materials for construction, that is, the use of miscellaneous materials at hand. Today, Bates Well contains

a ranch house that was moved there from the Growler Mine in 1942. It also contains several outbuildings and two corrals. Bates Well Ranch was listed on the National Register of Historic Places on May 20, 1994.

**Bull Pasture.** Bull Pasture is located in the upper reaches of the Ajo Mountains at an altitude of about 3100 feet. A trail leads up to Bull Pasture from Estes Canyon. Other than the trail entrance, there are steep cliffs on all sides. Bull Pasture is important to the cattle raising that took place in during the first third of the twentieth century as well as the border disturbances of the early twentieth century. Bull Pasture was listed on the National Register of Historic Places on September 1, 1978.

**Dos Lomitas Ranch.** The adobe ranch house at Dos Lomitas is regarded as a rare example of a Sonoran, Mexican built ranch house on the international border that shows an earlier style than its 1920 date of construction. The ranch house, an outbuilding, two ruins of buildings, and a mesquite and railroad-tie corral comprise the historic fabric. Vandalism of the historic structures has occurred; wood has been removed from the corral and other structures. Dos Lomitas Ranch was listed on the National Register of Historic Places on May 6, 1994.

**Gachado Well and Line Camp.** The Gachado Well and Line Camp was part of the first efforts of cattle raising in what is now the monument. The property contains an adobe house in the Sonoran Tradition of architecture and a corral of mesquite and paloverde, characteristic of the frontier practice of making do with what was at hand. The corral exhibits an innovative trigger gate or "gate trap that permits livestock to enter, but not to leave, the corral" (Greene 1977). Gachado Well and Line Camp was listed in the National Register of Historic Places on November 2, 1978.

**Growler Mine Area and Mining District.** The area commemorates a copper mine and lively town or settlement associated with the mine, which was named for John Growler. Today, nothing remains of the historic fabric of Growler Mine. The site, Growler Mine Area and Mining District, was listed on the National Register of Historic Places on November 14, 1978.

**I'toi Mo'o (Montezuma's Head)**

Montezuma's Head, or I'toi Mo'o is a sacred O'odham rock formation because of I'toi, a deity of the O'odham. The oral history surrounding Montezuma's Head concerns I'toi's appearance to the Tohono O'odham people, his instructions to them about proper living and surviving in the desert, his death and resurrection, and the possibility that he may return to earth at this place (Holy 1976). I'toi Mo'o was listed on the National Register of Historic Places as a traditional cultural property on May 2, 1994, and is the first traditional cultural property in the state.

**Milton Mine.** The mine is an example of a low-budget surface mining operation to extract gold and copper named for Jefferson Davis Milton (1861-1947), a frontiersman and agent for the United States Customs Service and then the Immigration Service, who knew the international border area well and established the mining claim in 1911. A concrete leaching vat is in evidence as well as a dump ramp, platform, and tippie of rough timbers, "which facilitated the loading of extracted ore onto trucks for transport to Ajo" (Greene 1977). Milton Mine was listed on the National Register of Historic Places on September 1, 1978.

**Victoria Mine.** "Victoria Mine represents the oldest known example of mining activity within the national monument and constitutes one of its major historical properties" (Greene 1977). It produced gold, lead, and silver and saw operations for over a hundred years, from 1870 until 1976. The stone walls of Mikul Levy's store survive as well as several shafts, which have been fenced off for visitor safety. Victoria Mine was listed on the National Register of Historic Places on September 1, 1978.

**Quitobaquito Springs.** Quitobaquito Springs is a cultural landscape—a landscape that reflects a sequence of human occupations with a rich ethnic history of various groups interacting with natural features from prehistoric times to the present period. Quitobaquito retains the essential elements of its natural setting to which prehistoric Paleo-Indian, Archaic, and Hohokam groups and historic O'odham, Spanish, Mexican, and Anglo groups adapted. Prehistoric and historic sites of habitation and occupation, historic irrigation, as well as two main springs, a human-made pond, and sites of

a fig and pomegranate orchard and adjacent corn field exist today. Inadvertent damage to archeological resources has occurred primarily because of undirected visitor use in this area. Quitobaquito Springs was formally determined eligible for listing on the National Register of Historic Places on August 18, 1994.

**ETHNOGRAPHY and ETHNOGRAPHIC RESOURCES**

The ethnography and ethnohistory of Organ Pipe Cactus NM mainly involve the traditional lifeways and cultural history of two American Indian groups who lived in the area or frequented it at the time of European contact. The territories of these groups—Tohono O'odham (formerly known as Papago) and the Hia-Ced O'odham (formerly known as Sand Papago)—overlapped within what is now the monument.

The Tohono O'odham were hunters, gatherers, and agriculturalists. In the latter case, they were known for their floodwater practices of diverting run-off water from washes to fields with weirs of mesquite and other native materials. Their farming pattern included a primary village for residence, with a spring or well or other permanent water source, and "temporals" or temporary camps at various fields. The fields were not always in close proximity to a group's or family's primary village. The fields were located to take advantage of floodwater or other rainwater runoff in ephemeral washes.

The Hia-Ced O'odham were known for nomadic hunting and gathering. They, too, had a settlement pattern utilizing a primary village with outlying temporary camps. The Sierra del Pinacate, much drier terrain in what is now Mexico, served as the location for the primary village. On the border with Mexico within the southwestern corner of Organ Pipe Cactus NM, Quitobaquito Springs served first as a temporary camp and then as a primary village when, during the mid-nineteenth century, the Hia-Ced O'odham fled north away from the Mexican Army, who was waging a campaign against them for alleged banditry. Other Native North American groups such as the Yuma to the west, the Pima to the north, and the Seri to the south may have regularly passed through on

## Affected Environments

trading treks in what is now Organ Pipe Cactus NM.

Today the Tohono O'odham Nation is situated immediately to the east of the park in Arizona. The Hia-Ced O'odham are scattered among various villages of the Tohono O'odham Nation as well as among several municipalities in the United States and Mexico such as, respectively, Ajo, Gila Bend, Phoenix, and Tucson in Arizona and Puerto Penasco, Quitovac, and Sonoyta in Sonora, Mexico. Some Tohono O'odham also live in Quitovac, which is southeast of Sonoyta. The Hia-Ced O'odham traditional territory included not only what is now Organ Pipe Cactus NM but also the Cabeza Prieta National Wildlife Refuge, the northwestern neighbor to the park in Arizona, and the Pinacate Biosphere Reserve, the southwestern neighbor to the park in Sonora, Mexico.

The Tohono O'odham lands in Arizona are part of the Gadsden Purchase of 1853. Their reservation status goes back to an executive order of July 1, 1874. Subsequent executive orders in 1882, 1911, 1912, 1916, 1926, 1931, 1937, and 1940 established the reservation complex of today consisting of one large and two smaller reservations for a total of 2,855,894 acres (Dutton 1984) comprising the Tohono O'odham Nation of eleven political districts. "The basic political document of the Papago [O'odham] is the constitution and bylaws ratified by the tribal members on 12 December 1936, and approved by the Secretary of the Interior on 6 January 1937" (Dutton 1984). The Tohono O'odham Nation has three branches of government like the United States Government—legislative, executive, and judicial—and each district is self-governing on local matters much like individual states within the United States federal system. The Bureau of Indian Affairs of the United States Department of the Interior now encourages cultural preservation and administers grants for such things as the classes taught in reservation schools on the Tohono O'odham language by Rosilda Manuel of the Gu Vo District.

The Hia-Ced O'odham and Tohono O'odham maintain strong interests in the park and are also part of the ISDA. O'odham people occasionally gather traditional plants in the park for food and medicine, and they sometimes

meditate and pray in sacred areas. They have been known to collect the ribs as a form of wood from dead organ pipe and saguaro cacti. They regard water from the springs at Quitobaquito as sacred and retrieve that when needed. They have the legal right to harvest fruit from the organ pipe and other cactii in the park as spelled out in the presidential proclamation of April 13, 1937, establishing Organ Pipe Cactus NM.

For the above purposes as well as going to a number of Indian cemeteries within the boundaries, the superintendent recently arranged for no park admission fees to be charged to visiting O'odham persons. Quitobaquito Springs and I'toi Mo'o (Montezuma's Head) are O'odham places of spiritual communion and sacred significance within the park. Quitobaquito is an oasis in the Sonoran Desert—a dependable source of water that has served habitation, settlement, and trade from prehistoric times to the present period and as a stop on the historic Tohono O'odham salt pilgrimage to the Gulf of California in Sonora, Mexico.

Montezuma's Head or *I'toi Mo'o* is a sacred O'odham rock formation that was listed on the National Register of Historic Places as a traditional cultural property on May 2, 1994. The O'odham make personal and family pilgrimages to Montezuma's Head because of *I'toi*. They visit, especially from the Gu Vo District, to meditate and worship and to leave gifts of food and personal belongings for I'toi. "Montezuma is the name western O'odham give to the deity, I'toi" (Hoy 1976). "I'toi's final retreat [on earth] is designated as [old] Mexico, and he is called Montezuma" (Underhill 1969). Montezuma's Head is held sacred because I'toi appeared on earth here, left and returned, and will return again to active life on earth. Some say that Montezuma's Head will be the spot and that I'toi will "return from the east, and...will descend the peak" (Hoy 1976). The oral history surrounding Montezuma's Head concerns I'toi's appearance to the Tohono O'odham people, his instructions to them about proper living and surviving in the desert, his death and resurrection, and the possibility that he may yet return to earth at this place (Hoy 1976).

I'toi figures into and is referenced in the summer wine-making ceremonies held in

various Tohono O'odham communities. The wine is made from the fruit of the saguaro cactus (Crosswhite 1980; McQuarry 1988), some of which is gathered regularly from Saguaro National Monument, near Tucson, and occasionally from Organ Pipe Cactus NM. "Utilization of the saguaro cactus provides a common thread uniting twentieth century Tohono O'odham groups with earlier peoples who also relied upon this humble desert plant for a variety of subsistence" and ceremonial needs (Clemensen 1987).

This area of Arizona is part of the borderlands culture existing along the border of California, Arizona, New Mexico, and Texas, in the United

States with Baja California Norte, Sonora, Chihuahua, Coahuila, Nuevo Leon, and Tamaulipas in Mexico. "La Frontera" or "The Frontier" is characterized not only by people coming there seeking work or business opportunities, but also by the movement back and forth of tourists and goods, and, as with the Tohono O'odham, by families with members living on both sides of the international border who share language and cultural ties. The rise in borderland industries and accompanying population growth has meant that the frontier, borderland region has developed a perspective and identity all its own.

## VISITOR USE and EXPERIENCE

### VISITOR PROFILE

Statistical data on visitor use was collected in a one-week survey from January 29, 1989 through February 4, 1989. The sample was based on 561 questionnaires returned from a total of 650 handed out in the monument. Monthly visitor use is presented in Table 5. Monthly figures consistently show that the heaviest visitation months are in the spring, declining in summer months and then increasing again in fall and winter. During the study, visitors arrived more frequently during the week and less on weekends. Over 80% of survey respondents were over 50 years of age, with 54% in the 50-59 age bracket (Table 6). These age data are comparable to a 1970 study, which revealed that over 70% of visitors were over age 50. Visitors were asked to reveal their geographical origin in the survey by providing their postal zip code of their permanent residence. About 18% of visitors came from California, followed by Arizona with 12%. Approximately 75% of the survey respondents stayed at the monument for 1 or more nights.

Of these overnight visitors, a majority stayed 1-4 nights.

The predominant mode of transportation was the passenger car (38%), however, some visitors had more than one type of vehicle with them. Nearly 53% of visitors used either a recreational vehicle or trailer. No tour buses were recorded in the survey.

The range of visitor activities are presented in Table 7. These results indicate activities more associated with recreational-vehicle camping and less in the area of camping and backpacking. Almost 60% of the visitors indicate use of Lukeville for commercial services, which suggests that services in that area are meeting some sustenance needs of the visitors. The dominant use of the monument appears to be by recreational-vehicle campers who take moderate walks on designated trails and participate in the evening interpretive programs.

**Table 5. Visitation by Month 1989-1993**

MONTH	1989	(%)	1990	(%)	1991	(%)	1992	(%)	1993	(%)
Jan	27608	12.7	27351	12.6	22408	9.8	26185	10.1	21887	8.7
Feb	40583	18.7	41098	18.8	33653	14.7	37913	14.6	31846	12.7
Mar	42539	19.6	42884	19.6	42105	18.4	52478	20.1	55222	22.0
Apr	19327	8.9	24760	11.3	29961	13.1	38156	14.6	37373	14.8
May	12655	5.8	14054	6.4	17137	7.5	14078	5.4	13794	5.5
Jun	7723	3.6	8231	3.8	9076	4.0	9041	3.5	9131	3.6
Jul	7153	3.3	6585	3.0	8138	3.6	8087	3.1	8059	3.2
Aug	7597	3.5	7238	3.3	7725	3.4	7666	2.8	7920	3.1
Sep	8399	3.9	5370	2.5	7425	3.2	7584	2.9	8041	3.2
Oct	11118	5.2	8990	4.1	11212	4.9	13244	5.1	12867	5.1
Nov	15810	7.3	15748	7.2	20671	9.0	22377	8.6	21993	8.7
Dec	16302	7.5	16112	7.4	19331	8.4	23868	9.2	23643	9.4
<b>TOTAL</b>	<b>216814</b>	<b>100</b>	<b>218421</b>	<b>100</b>	<b>228842</b>	<b>100</b>	<b>260677</b>	<b>100</b>	<b>251776</b>	<b>100.00</b>

Table 6. Age Ranges of Visitors

Age	Percent
<20	0.6
21-29	1.4
30-39	3.1
40-49	4.6
50-59	17.1
60-69	54.1
70+	19.1

Table 7. Activities of Visitors

Types of Activities	% Participated
Visitor center	94.5
Commercial services	59.9
Hiking > 1 hour	45.6
Hiking < 1 hour	44.2
Night programs	39.2
Picnic	31.9
Nature	29.4
Ranger talk	26.9
Lukeville at night	10.7

## VISITOR EXPERIENCE

"Deserts are places that offer a special sense of peace and tranquility and provide spiritual refreshment for the soul." Statements such as this one, made by a member of the park staff, characterize the special quality of the visitor experience at Organ Pipe Cactus NM. Peace, beauty, open space, and solitude are repeatedly emphasized as components of importance to the park's visitors.

During sessions with the public early in the planning process, most participants were in agreement that the park's natural and primitive character are of prime significance to their

experiences at the park. Some felt that the plan should allow no changes from the present condition, while others felt that some additional development would be acceptable, but only in certain zones or corridors of the park.

The values voiced by many planning participants are reflected in the attitudes of park visitors and in the way they use the park. In the 1989 survey, visitors were asked about the importance to them of various park attributes. Ninety-one percent of the respondents indicated that park scenery was "extremely" or "very" important to them, 72 % rated solitude as extremely or very important, and 58% said the same about the clear night sky. All of these responses indicate the value of a quiet, natural park undisturbed by developments and the distractions of noise, traffic, and lights.

Organ Pipe Cactus has an unusual visitation profile. Most park visitors are over 50 years of age (Table 6), and at least two thirds of the visitors spend at least one night at the park while almost half stay at least three nights (Table 7).

The primary park experience is driving one or both of the scenic unpaved one-way loop drives: the 21-mile Ajo Mountain Drive and the 53-mile Puerto Blanco Drive. Other primitive roads occur in the park but are infrequently traveled as they require four-wheel drive vehicles. While some visitors reported in the survey that they disliked the unpaved roads, half of the respondents said they would not like to see the roads improved. About one third of the respondents suggested road improvements, but only about one third of these respondents suggested paving the roads, and the remaining favored other upgrades such as better surface grading and maintenance, more turnouts, and additional picnic spots along the way.

Over half of the park visitors hike trails, and about 8% reported that they hike cross-country in the park. Many visitors surveyed asked for more trails; 21% of them asked for a greater range of trail lengths, and 14% felt that all park trails should remain primitive.

The survey also asked some open-ended questions about what visitors liked most and least about the park, their suggested ideas for

### *Affected Environments*

future park planning, and anything else the visitors wished to say about their visit. The most frequent responses were to "leave the park as it is;" i.e., continue to protect and preserve the park's resources and avoid over-

development. Many respondents expressed values of peace, quiet, and solitude that they associate with the landscape at Organ Pipe Cactus NM.

# PARK OPERATIONS

## STAFFING AND OPERATIONAL COSTS

At present, the equivalent of 27 full time employees comprise the staff of Organ Pipe Cactus NM. The park's annual base operating budget for fiscal year 1994 was \$1,127,000. In addition, the park received approximately \$181,000 for enforcement related to drug activities. The following table lists the division and title of the various positions.

Table 8. Existing FTE Positions

Staff division and positions	FTE
<b>Administration</b>	
Park Manager	1.0
Administrative Technician	1.0
Administrative Clerk	1.0
<b>Interpretation and Visitor Protection</b>	
Chief of Interpretation and Visitor Protection	1.0
Supervisory Interpretive Specialist	1.0
Park Ranger (Resource Education)	2.0
Supervisory Park Ranger (Visitor Protection)	1.0
Park Ranger (Visitor Protection)	5.0
<b>Maintenance</b>	
Chief of Maintenance	1.0
Engineering Equipment Operator	1.0
Carpenter	1.0
Maintenance Worker	1.0
Automotive Worker	1.0
Motor Vehicle Operator	1.0
<b>Natural and Cultural Resources Management</b>	
Chief, Resources Management	1.0
Ecologist (GIS)	1.0
Plant Ecologist	1.0
Wildlife Biologist	1.0
Resource Management Specialist	2.0
Biological Science Technician	1.0
Geographer	

## FACILITIES

### Roads

There are one state route and two scenic drives that provide the primary vehicular circulation.

State Route 85 transverses the monument between the north and south boundaries providing access to the monument from Arizona and from Mexico. Small entrance signs mark the entrance to the park. Since much of the traffic travelling on the road greatly exceeds the 55 mph speed limit, many people do not see the signs and do not realize they have entered a unit of the NPS. There are no designated waysides along State Route 85, although many vehicles stop and park on the edge of the road creating a safety hazard.

Ajo Mountain Drive is a one-way dirt road, 21 miles in length that loops around and through the Diablo Mountains and along the foothills of the Ajo Mountains. Puerto Blanco Drive is a 53-mile dirt road that circles the Puerto Blanco Mountains and provides access to Quitobaquito Springs. In addition, there are four unmaintained roads used by four-wheel drive vehicles: the Bates Well Road and Camino de Dos Republicos, Growler Valley Road, and Armenta Road.

### Trails

Hiking trails in the monument include the Visitor Center Nature Trail (0.1 mile roundtrip), Campground Perimeter Trail (1.0 mile roundtrip), the Desert View Nature Trail (1.2 miles roundtrip), Palo Verde Trail (2.6 miles roundtrip), Estes Canyon-Bull Pasture Trail (4.1 miles roundtrip), and the Victoria Mine Trail (4.5 miles roundtrip). There are also eight primitive, unmaintained, backcountry destination trails in the monument originating from Ajo Mountain Drive, Puerto Blanco Drive, or Alamo Canyon.

### Camping Areas

Three types of camping occur within the park: recreational vehicle camping in campgrounds, drive-in/primitive camping in campgrounds, and backcountry camping in wilderness areas. Each of these types of camping provides a different camping experience. Even though no electrical or water hook-ups are available to recreational vehicles in the Twin Peaks campground, this type of camping offers the

## Affected Environments

most amenities. The Twin Peaks Campground contains 208 sites for RV or vehicle use, 6 restroom facilities, water, grills, tables, dump stations, and paved parking pads. Although most of these sites are used by RVS, there is no electrical or water hookup, and no plans for adding these services. A 44-bench amphitheatre that seats up to 300 person is located adjacent to the campground and is used for evening interpretive programs. This facility is outdated and in poor condition. A short drive away there is a group campground site with 5 group sites: 2 sites for RV use and 3 sites that can accommodate 4-6 tents per site. The group area also contains one rest room facility.

The drive-in/primitive campground at Alamo Canyon Wash contains four walk-in tent sites with adjacent parking and one vault toilet facility, but is less developed and contains fewer concentrations of sites than the previous camping type. There is an ever increasing demand for this type of camping experience as these sites fill up quickly in the high use period. Other visitors park at the campground to use this popular and scenic area during the day. The parking spaces are not defined, and when there are many visitors, it is difficult to maneuver a vehicle in the area.

In contrast, backcountry camping offers the most primitive and isolated experience in the Sonoran Desert Wilderness, far from vehicles and developments. A permit is required and is obtainable at no charge at the visitor center. The wilderness is divided into backcountry

zones, and the size of backpacking groups is limited by a carrying capacity figure and the "largest party size" set for each backcountry zone.

### Light Pollution

Outdoor lighting used for existing developments in the park affects the ability to view the nighttime sky from some adjacent wilderness areas. Currently, there are no federal standards for outdoor lighting to help protect visual resources. The Pima County Outdoor Lighting Code sets standards for outdoor lighting so that its use does not unreasonably interfere with astronomical observations from Kitt Peak and Mount Hopkins Observatories. The intent of the code is to encourage lighting practices and systems that conserve energy and enhance enjoyment of the nighttime sky without decreasing safety, utility, security, and productivity of lighting systems.

The outdoor lighting regulations apply to two restrictive zones or areas. Area A forms a 35 mile radius from the center of the Kitt Peak Observatory, and a 25-mile radius from the center of Mount Hopkins Observatory. Area B includes all areas within Pima County that are outside of Area A and outside the territorial limits of Indian Reservations and other federal lands. While Organ Pipe Cactus NM is not required to comply with this code, the park is interested in applying the code to help protect visual resources.

Table 9. Shielding Requirements<sup>1</sup>

FIXTURE LAMP TYPE	SHIELDING: AREA A	SHIELDING: AREA B
Low Pressure Sodium	Partially	Partially
High Pressure Sodium	Prohibited, except fully shielded on arterial streets and collector streets of 100' or more in right-of way width.	Fully
Metal Halide	Prohibited	Fully
Florescent	Fully	Fully
Quartz	Prohibited	Fully
Incandescent > 160 watts	Fully	Fully
Incandescent ≤ 160 watts	None	None
Any light source of ≤ 50 watts	None	None
Glass tubes filled with Neon, Argon, Krypton	None	None

<sup>1</sup> Refer to the Tucson/Pima County Outdoor Lighting Code for specific regulations concerning each lamp type.

Shielding requirements for both areas are shown in Table 9. Area A prohibits use of some types of fixture lamps and partial or full shielding of others. Area B regulations include partial or full shielding of various fixture lamps.

### **Power Lines**

Arizona Public Service Company provides power to the monument by power lines that enter the monument from the north boundary and terminate in Lukeville. The primary power line lies west of State Route 85, and the secondary lines are routed to Twin Peaks and to Lukeville.

### **Twin Peaks Area**

**Visitor Center/Administration Building.** The 5,900 square foot visitor center and administration building is Mission-66 era in style with a later addition of a 100-seat theater. The visitor center occupies one side of the complex and consists of an entrance lobby with an information desk, restrooms, a courtyard and nature trail, research library, auditorium, museum, and an office. This portion of the facility is used by 95% of park visitors (Visitor Survey, 1989). Compared to many other parks, this is an extremely high use figure. The orientation and interpretation function of this center is obviously of much importance to park visitors.

Public spaces share the building with park administrative spaces, including five offices, a library, and a supply room, and all functions are cramped. Only the theater is adequate in size. While interpretation planners believe the building is well-designed functionally, it is simply too small to accommodate offices, exhibits, and spaces for information, reception, and publication sales. The building will feel increasingly cramped as time passes, especially during the winter season. There is no space for new exhibits or other media to accommodate desired changes in park themes and programs.

**Maintenance Facility.** The 9,700 square foot maintenance area contains offices, workspace, materials storage areas, and parking bays for maintenance vehicles. Workspace includes a carpenter shop, supply storage, plumbing shop, a small paint shop, office/supply area, 2 auto bays, a welding bay, and a wash bay. There are

parking bays for vehicles, a store room, a fire cache, and an administrative office. Due to lack of covered storage, many materials are stacked out of doors.

The park recently acquired a new fire engine. The vehicle currently sits in the maintenance yard since there is no covered parking area large enough to store it.

**Employee Housing Area.** The employee housing loop has 14 residential housing units including 12 houses and one duplex. A second duplex was recently constructed near the entrance to the campground. Two of the houses are used as dorms for seasonal employees.

Due to a shortage of work space, several homes have been converted into office space. A house trailer serves as park protection offices and is inadequate. Two homes are now being used as the resources centers, offices, museum, library and archive storage, and information management facility.

A greenhouse and nursery are located near one resource center. Used for recurring vegetation projects and for research, these facilities are also popular attractions for visitors. The solar heated greenhouse is 80 square feet, with a storage shed and an automatic watering system. The nursery, approximately 400 square feet, includes a shade area, a materials mixing area, and a non-functional drip irrigation system.

The VIP trailer park is also located in this loop area and consists of 12 RV spaces with hook-ups for water, electricity, and sewage.

### **Quitobaquito Springs**

Existing developments for visitor use are substandard and lack coherent design. Informal paths lace the area and are random and undirected. Visitors do not receive orientation to the site, nor do they receive information about how to use the area without adversely impacting the sensitive resources found there. The parking area and approach to the spring have an improvised appearance, and vandalism of picnic tables and are signs is apparent.

Car vandalism and theft of visitors' property is a frequent occurrence at this site. The vandalism occurs when people leave their vehicles

## *Affected Environments*

unattended. A sign at the area was erected to warn visitors of this problem and to suggest that one member of the party stay with the vehicle to protect valuable possessions.

### **Lukeville**

Lukeville is an unincorporated, intensively-developed border community located within park boundaries, 81 miles south of Gila Bend, Arizona, and 5 miles south of the park's visitor center. It consists of approximately 65.33 acres of privately-owned lands surrounding the International point-of-entry and terminus of State Route 85 and an 8.18 acres U.S. Customs and Immigration Reserve.

Privately-owned developments consist of a 10-unit motel, a 95-site campground for recreational vehicles, 8 mobile home sites, and an apartment building. Services include a commercial block with cafe, bar, general store, convenience store, laundry, post office, two gas

stations, automotive repair, and storage facilities. Property formally known as the Kalil Tract contained additional commercial services. The Customs and Immigration border facility contains border operations facilities and 13 residences. Other uses within Lukeville include a landfill, and an airstrip along the eastern boundary of the town.

The border crossing at Lukeville is the only access to Mexico between Sasabe, approximately 85 miles to the east, and San Luis, approximately 130 miles to the west, thus it is an important access point for Americans traveling to the upper portion of the Gulf of Mexico, and for Mexicans entering the United States from northwestern Sonora. The port-of-entry has limited hours. Consequently, vehicles back up in the monument waiting for the entry to open, especially during spring break for American universities and American holidays, such as Labor Day.

## THE REGIONAL ENVIRONMENT

### SURROUNDING LAND USES

Organ Pipe Cactus NM consists of 330,689 acres in southwestern Pima County, Arizona. It is located approximately 150 miles west of Tucson and 150 miles southwest of Phoenix. Surrounding land is owned by the Bureau of Land Management (BLM) to the north, Cabeza Prieta National Wildlife Refuge to the north and west, the state of Sonora, Mexico to the south, and the Tohono O'odham Indian Reservation to the east and northeast.

To the north a 12-mile boundary is shared with the BLM. Land uses include livestock grazing.

The Cabeza Prieta Wildlife Refuge is located along 26 miles of the monument's northern and western boundary. The refuge is administered by the United States Fish and Wildlife Service (USFWS). The refuge consists of approximately 860,000 acres, 95% of which is designated as wilderness. Over 95% of the refuge is within the boundaries of the Barry M. Goldwater Air Force Range. The airspace above the refuge is used to practice aerial gunnery on towed targets. Air-to-air bombing and gunnery ranges are also located on the bombing range to the north.

To the south, the monument shares a 31-mile boundary with the state of Sonora, Mexico. A majority of adjacent land is divided between cooperative farms, called "ejidos", and privately-owned farms and ranches. The closest urbanized area is the town of Sonoyta, located along Mexico Highway 2 approximately three miles from the international boundary. Agricultural lands along the border, east of Sonoyta, consist of fruit orchards, wheat, cotton, alfalfa, and some vegetables such as onions, beans, and corn. The drier border lands west of Sonoyta are not as fertile and consist of subsistence farming and ranching. Since 1966, the Mexican government has implemented a program to encourage and subsidize development of land and water resources throughout northern Sonora including the Sonoyta Valley. In 1968, a total of 45 wells, including 12 irrigation wells had been established. By 1982, 125 active agricultural

wells had been reported. Groundwater to irrigate crops in the Sonoyta Valley is being pumped out of the aquifer at 2.5 times the recharge rate (Brown 1988). This aquifer is shared by the monument, and the subsequent lowering of the water table poses a major threat to its natural resources. Moratoriums are currently in effect to prohibit development of new wells for irrigation, and to limit the land developed for irrigated agriculture to the present 32,000 acres. Total pumping capacity of the Sonoyta Valley, however, is estimated to be 191,000 acre/feet, more than six times the estimated annual groundwater recharge rate.

Proceeding southwest of the town of Sonoyta, two Biosphere Reserves—El Pinacate y El Gran Desierto de Altar (The Pinacate and Great Desert), and Alto Golfo de California y Delta del Rio Colorado (Upper Gulf of California and Delta of the Colorado River)—constitute a land and marine reserve totaling approximately 1.6 million hectares (3.952 million acres).

The Tohono O'odham Indian Reservation, which comprises approximately 2.8 million acres, shares the monument's 31-mile eastern boundary. The Ajo Mountain range forms a natural border between most of the monument and the reservation. The Tohono O'odham national headquarters are located in Sells, which oversees 11 districts and 70 villages. According to 1994 reservation reports, population is estimated at 10,000 persons. Land uses along the western portion of the reservation include grazing and subsistence activities. Much of the reservation is considered open range for cattle and horse grazing.

### SOCIOECONOMY

#### Pima County

Organ Pipe Cactus NM is located in Pima County, which is situated in the central portion of southern Arizona, bordering Mexico to the south, Maricopa and Pinal Counties to the north, Santa Cruz and Cochise Counties to the east, and Yuma County to the west. Pima

## Affected Environments

County covers approximately 9,200 square miles, 70% of which are federal or Indian lands. The County consists of the Tucson metropolitan center, and scattered satellite communities in outlying areas.

By the 1950's, the rural and small town setting of Pima County had changed. Agriculture, ranching, and mining activities slowed considerably as educational, medical, and defense-funded research and manufacturing in metropolitan Tucson began to develop and expand. Arizona's mild climate and relatively inexpensive cost of living also served to attract people to the area, and the resulting manufacturing and service employment helped to diversify the local economy. Land development as a result of the influx of residents further changed and diversified the economic structure of the County.

**Population.** Pima County's growth rate is consistent with the high growth rate experienced in Arizona since the 1950's. Census reports indicate that approximately 19% or 666,880 Arizona residents, resided in Pima County in 1990. By the year 2015, population is projected to be approximately 1,096,930 persons. Pima County continues to experience a high annual population percentage change of about 2% per year, compared to the national

average annual rate of approximately 1% per year. From 1985 to 1990, Pima County experienced a 14.7% population growth.

Approximately 95% of the county's population is concentrated in eastern Pima County in the greater Tucson area. Smaller rural communities, including Ajo, Lukeville, and Why, in western Pima County, have experienced limited growth due to economic conditions.

In spite of the high proportion of non-native and non-Hispanic newcomers, the multicultural flavor of the region still remains. According to the 1990 census, 24.5% of the total population is Hispanic, compared to the national average of 9.0%. Two Indian tribes, the Tohono O'odham and Pascua Yaqui, comprise approximately 1% of the population, while black and asian races contribute to 3% and 2% of the county population, respectively.

**Economic Growth.** Employment trends in Pima County is presented in Table 10. Generally, between 1960 and 1990, the employment base began to shift towards the services sector, which includes retail and eating establishments, and away from all other employment sectors except manufacturing.

Table 10. Employment Trends in Pima County

INDUSTRY	1960 EMPLOYMENT (%)	1990 EMPLOYMENT (%)	PROJECTED GROWTH 1990-2015 (%)
Trade	15,600 (22.2)	59,500 (19.3)	71,292 (19.3)
Government	14,200 (20.2)	58,650 (19.0)	38,150 (10.3)
Services	12,000 (17.0)	105,739 (34.3)	171,939 (46.6)
Manufacturing	8,400 (11.9)	26,600 (8.6)	33,749 (9.1)
Construction	6,800 (9.7)	14,700 (4.8)	20,079 (5.4)
Transportation, Communications, Public Utilities	5,500 (7.8)	9,300 (3.0)	4,560 (1.2)
Finance, Insurance, Real Estate	3,000 (4.3)	27,546 (8.9)	28,155 (7.6)
Agriculture	2,000 (4.1)	4,048 (1.3)	—
Mining	2,900 (2.8)	2,200 (0.7)	1,100 (0.3)
<b>TOTAL</b>	<b>82,400</b>	<b>308,283</b>	<b>369,024.00</b>

Projected employment growth from 1990 to 2015 is consistent with past growth trends. To accommodate the increasing demand in the retirement and tourist industries, the services sector is projected to account for nearly 47% of total growth in the employment base. This steady increase in this type of employment is generally reflected in lower paying jobs and lower household incomes. In 1990, the median household income in Pima County was \$25,401, and the median value of owner-occupied housing units was \$76,500, compared to the national averages of \$30,056 and \$79,100, respectively.

Tourism has long been a major economic force in Pima County. It is estimated that tourism brings in over 2.5 billion dollars to the local economy, with 74.5 million tax dollars in revenues. In addition, approximately 77,800 Pima County jobs rely on tourism.

**Western Pima County.** Western Pima County has developed its own separate and distinct economic structure. Historically, the area was heavily dependent on large-scale mining operations. In recent years, however, the economy has been affected adversely by the loss of mining activities in the immediate area, and the collapse of the Gulf of California shrimp industry in Mexico. In an attempt to revive the sluggish economy, recreation and tourism are being marketed as potential replacements to lost industries.

**Ajo.** The town of Ajo is located 35 miles north of Organ Pipe Cactus NM, and is accessed by State Route 85. Ajo has historically been heavily dependent on mining operations for economic stability. In 1980, Ajo had a population of 5,189, 60% of which was employed by the Phelps Dodge Corporation. Subsequent to the closure of mining operations in 1985, Ajo's population decreased to 2,600 with a loss of 1,000 jobs. Currently, Phelps Dodge is attempting to divest itself of town management in Ajo and focus efforts on the mining business, with the possibility of reopening local mines in the future. In order to replace lost mining revenues, the town is now being marketed as a retirement community. Since 1986, nearly 900 houses once owned by Phelps Dodge have been sold to new residents,

mostly retirees. In fact, home sales to retirees have increased from 40% in 1985 to 99% in 1992. The 1990 census indicated a population of 2,542, with a projected population of 2,707 by the year 2000.

Ajo employment structure showed 70% of the employment in retail sales and service, 12% in public administration, 8% in mining, 7% in construction and real estate, and 3% in miscellaneous employment. A variety of commercial facilities are available including two grocery stores, seven restaurants, three motels totalling 42 units, two bed-and-breakfast establishments, and an 80-space RV park.

**Why.** The unincorporated community of Why is located 25 miles north of the Visitor Center in Organ Pipe Cactus NM and 10 miles south of Ajo, at the point where state routes 85 and 86 converge. Why offers services to local residents, tourists, and travelers heading south towards Organ Pipe Cactus NM and Mexico. Services include two gas stations, two small-scale general stores, a post office, and two cafes. Two RV parks totaling 800 spaces are also located in Why. Why is surrounded by BLM lands, thus, expansion is not possible unless public lands are sold.

### **Maricopa County**

Maricopa County is located approximately 120 miles northeast of Organ Pipe Cactus NM. Most of the population in Maricopa County is concentrated in the greater Phoenix area. This metropolitan area is the ninth fastest growing in the nation. The U.S. Census Bureau reported that Maricopa County had a population of 1,509,175 in 1980, and a population of 2,122,101 in 1990. Major economic growth in the greater Phoenix area began with agriculture and the development of defense industries that followed military airfields located in the area during World War II. Presently, the economic base of Maricopa County has a diversified with a shift away from defense manufacturing and an increase in electronics manufacturing, government services, and tourism. The services and retail trade industries are also strong employment sectors, constituting over 50% of total employment.

## *Affected Environments*

### **Yuma County**

Yuma County is located west of Organ Pipe Cactus NM, in the extreme southwestern portion of Arizona. Yuma County's economy is centered around its hot, dry, climate and its location along the Colorado River, and midway between the metropolitan areas of southern Arizona and southern California. These natural characteristics have been reflected in an economy heavily dependent on agriculture, ranching, and tourism. Military operations are also considered important to the local economy with the Marine Corps Air Station and Yuma Proving Grounds located in the County. The city of Yuma, which is located approximately 200 miles west of the monument, is the only major urban center in the county. Census data report a 1990 population of 106,895 persons, of which nearly 54,923 lived in the city of Yuma.

### **Tohono O'odham Reservation**

The Reservations of the Tohono O'odham nation are located in south-central Arizona, the largest of which shares the eastern border of Organ Pipe Cactus NM, and which has been discussed in this document. This reservation, known as the Tohono O'odham Reservation, contains 2,773,357 acres, extending into Pima and Pinal counties in Arizona.

The Tohono O'odham reservation in Sells, Arizona, reported a 1990 population of 8,740 and a 1994 population of 10,000. Within the period between 1989 to 1991, the unemployment rate rose from 30% to 66%. This increase can be attributed to more accurate data collection and analysis.

Two principal economic activities on the reservation include employment by Federal, State, and Tribal Agencies, and cattle raising and related activities. Growth in tourism, agricultural, retail-tourism, and utilities sectors are expected as tribal development plans are implemented. Proposed development projects will also provide jobs in construction, as new housing units, a shopping center, a gaming center, mining and chemical concerns, and several tourism facility projects are planned.

Currently, there are no lodging facilities on the reservation, however, plans for a RV park and gaming facilities has been proposed in the Gu

Vo district, located in the western region of the reservation.

### **Mexico**

The Mexican state of Sonora is located immediately south of Organ Pipe Cactus NM. Northwestern Sonora is sparsely populated, with inhabitants located in small communities, or scattered on many cooperative and private farms that cover the state.

The northwestern part of Sonora immediately adjacent to Organ Pipe Cactus NM is included in the Municipio of Plutarco Elias Calles. The Municipio includes the town of Sonoyta, approximately two miles south of Lukeville, near the border.

The community of Sonoyta has a reported population of 12,000. Approximately 9,000 inhabitants are located in the urban area, and the remaining population occupies the surrounding agricultural areas.

The economic structure of Sonoyta consists of approximately 60% commercial and industrial services, 20% agricultural and ranching, and 20% financial and other services. Tourism is a major component of the economic structure of the community, however, American visitors travelling to and from the Gulf areas contribute to only a part of tourism revenues received by the community. Of at least equal or greater importance to Sonoyta's tourist industry is the town's position along the major Mexican highway between the large population centers in Baja California and interior Mexico. Tourism patterns in Mexico are distinctly different depending on nationality. American visitors have a significant economic impact on the region on U.S. National holidays such as Memorial and Labor Days, whereas Mexican visitors contribute a smaller but constant flow of tourism dollars to the area, mainly through lodging and dining.

The ease of access between Puerto Penasco and Arizona (via State Route 85 through Organ Pipe Cactus NM) has created a tight symbiotic relationship through the export of shrimp from Mexico to Phoenix and Tucson, and tourism in the Gulf of Mexico resulting from devaluation of the peso in 1980. In recent years, however, the shrimp industry has collapsed as a result of

continuous overharvesting. Tourism businesses have suffered losses as inflation has countered low prices for goods and services that followed the peso's devaluation.

### Transportation

Organ Pipe Cactus NM is accessed by State Route 85. State Route 85 originates at Interstate 10 approximately 15 miles west of metropolitan Phoenix, Arizona, and terminates approximately 120 miles south at the United States/Mexico border. This highway corridor also intersects Interstate 8 at Gila Bend, Arizona, and links with State Route 86 at Why, Arizona. State Route 85 currently serves as the only access to Organ Pipe Cactus NM, and is the only port-of-entry to Mexico between the Yuma/San Luis port-of-entry, and the Nogales, Arizona/Nogales, Sonora port-of-entry. From Why, Arizona to the monument entrance, southbound traffic is classified as 80% in-state autos, 16% out-of-state autos, and 7% commercial vehicles. Northbound traffic consists of 77% in-state autos, 14% out-of-state autos, and 6% commercial vehicles. Arizona Department of Transportation (ADOT) 1992 traffic counts revealed a peak traffic month in March and a low traffic month in August. Peak traffic days, measured in February and August, show Friday to be the busiest day, and Wednesday having the least amount of traffic.

### North American Free Trade Agreement

The North American Free Trade Agreement (NAFTA), approved by the Clinton administration in November, 1993, is expected to alter significantly economic relations between the United States and Mexico. The free trade agreement is expected to increase commerce dramatically between the two nations. Accompanying the growth in commerce will be increased heavy truck traffic on southern Arizona highway corridors. State Route 85, which bisects the monument, is used to access Puerto Penasco, at the Gulf of California. Currently, commercial vehicles account for only 10% of the total traffic on this route, however, future growth in heavy truck traffic will require additional investment in these corridors to and from Mexico to meet the new demands placed on them.

Anticipating this traffic increase, expansion plans at the U.S. Customs and Immigration Service's Lukeville port-of-entry include a new commercial vehicle inspection dock with the capacity to simultaneously inspect three to five trucks. The ADOT has adopted a *Five Year Construction Program* for fiscal years 1992 through 1996. Through this program ADOT has allocated \$7,430,00 for highway improvements along State Route 85 and the State Route 85 spur from I-10 to Lukeville (1991 dollars). The cost reflects both current needs for highway improvements and the costs anticipated for future improvements as a result of NAFTA. In addition, current pavement preservation and other maintenance costs are expected to increase approximately double the current requirements.

ENVIRONMENTAL  
CONSEQUENCES



## INTRODUCTION

As required by the National Environmental Policy Act of 1969 (NEPA), the potential consequences of implementing different alternatives in Organ Pipe Cactus NM were analyzed. The following discussion of consequences addresses the adverse and beneficial impacts on the human environment that are expected to occur when an action is implemented. A chart summarizing the environmental consequences can be found in the summary section, behind the summary of alternatives.

The analysis of environmental consequences assumes full implementation of alternatives discussed. It is important to note that the rate of initiating programs and developments largely depends on funding and staffing levels. As an example, if funding permits the addition of four employees per year, it would take at least seven years to reach the number of employees needed under existing conditions. Under this assumption, it would take an additional two years to reach the minimum number of employees needed to fully implement the proposed action in Alternative 1. If funding and staffing levels see only modest growth over the next decade, Organ Pipe Cactus NM would still continue to implement actions, but at a much slower rate.

### Impact Topics

A series of impact topics were developed to allow comparison of the environmental impacts of each alternative. The topics, listed below, are based on public and other agency concerns identified during scoping, various legislative requirements, and the affected environment section. Two topics were considered but were dismissed from further analysis because they are not applicable. Federal agencies are required to analyze the impacts of Federal actions on *Prime and Unique Agricultural Lands*, in accordance with NEPA and the Farmland Protection Act. No prime or unique agricultural lands occur in the monument and therefore, there is no analysis written. The second topic was raised during meetings with the public and involves the legislated right of American Indian groups to use the monument.

The right to pick cactus fruit in the park would not be affected by either of the alternatives and is therefore not discussed further.

A description of associated Federal and State laws that each alternative must comply with is given under the appropriate topic. For cultural resources, compliance with sections 106 and 110 of the National Historic Preservation Act of 1966, as amended, is discussed in Appendix E.

**Wilderness.** More than 95% of the park is designated wilderness and potential wilderness. Management of the Organ Pipe Cactus Wilderness must comply with the Wilderness Act (1964) and NPS management policies. Actions are proposed that would affect the protection of wilderness-related values and the amount of wilderness in the park.

**Air Quality.** The clarity of the night sky and the ability to see across vast distances are some of the park's most significant resource values and are directly related to air quality in the park. The Clean Air Act authorizes federal land managers to protect park air quality, yet the current and future quality of park air resources depends heavily on the actions of others.

**Floodplains, Wetlands, and Water Resources.** The water resources in the park, including floodplains and wetlands, are protected and managed by Executive Order 11988 "Floodplain Management", Executive Order 11990 "Protection of Wetlands", the Federal Water Pollution Control Act Amendments of 1972, and the Clean Water Act of 1977. Quitobaquito is the only wetland environment within the monument that would be affected by the alternatives.

**Threatened, Endangered, and Sensitive Species.** The Endangered Species Act of 1973, as amended, requires an examination of impacts on all federally listed threatened or endangered plant and animal species. About five of the listed species in the park could be affected by actions in the alternatives.

**Wildlife.** The NPS Organic Act and Management Policies provide protection for

## *Environmental Consequences*

wildlife resources. These resources could be affected by changes to human use and development patterns.

**Vegetation and Soil.** As with wildlife, the Organic Act and Management Policies also protect vegetation and soil resources which could be affected by actions changing the human use and development patterns in the park.

**Cultural Resources.** Significant cultural resources—archeologic, historic, and ethnographic—can be found within the park. The NPS Organic Act and Management Policies, the National Historic Preservation Act, and NEPA require protection and examination of impacts on all cultural resources. The National Historic Preservation Act and NPS planning and cultural resource guidelines also require consideration and protection of archeological resources for any development proposals. In addition to the legislative requirements, the Tohono O'odham and Hia-Ced O'odham expressed concerns during scoping meetings regarding the past and present uses of ancestral lands (or ethnographic resources) now within the monument. Facility development, visitor use, and prescribed treatments may affect some of the archeological and historic resources in the park, while actions related to interpretation, archeology, and research could potentially affect use of some ancestral lands.

**Visitor Use and Experience.** Visitor experience and enjoyment of the scenic resources are protected by the NPS Organic Act and Wilderness Act. These acts state, respectively, that the fundamental purposes of

the park are "to conserve the scenery" and retain its "primeval character and influence". Effects on visual resources and thereby the visitor experience, could result from several actions in the alternatives.

The Architectural Barriers Act of 1968 and the Rehabilitation Act of 1973 require facilities, services, and programs to be as accessible to disabled visitors as feasible. Access would be affected by developments proposed in the alternatives.

**Socioeconomics.** NEPA requires an examination of socioeconomic impacts caused by implementing management alternatives. This concern regarding the potential socioeconomic impacts on communities surrounding the park was also raised during scoping meetings with the public and other agencies. NAFTA and increases in visitation and staffing are expected to have socioeconomic impacts on the park as well as on the region.

**Cumulative Impacts.** As required by NEPA, cumulative impacts were analyzed for each impact topic listed above. Cumulative impacts on wilderness and the natural, cultural, and socioeconomic environments are expected. These impacts are described under this topic heading to allow comparison and to avoid redundancy in the document. Also required by NEPA, this discussion includes unavoidable adverse impacts, irreversible and irretrievable commitments of resources, and short-term uses versus long-term productivity.

## ENVIRONMENTAL CONSEQUENCES

### IMPACTS ON WILDERNESS

Management of the Organ Pipe Cactus Wilderness, which comprises approximately 95% of the monument, must comply with the Wilderness Act (1964) and NPS management policies. The Wilderness Act mandates that wilderness be undeveloped, retain its primeval character and influence, and be devoid of permanent improvements or human habitation. NPS management policies state that such areas be managed to preserve their wilderness character and resources while providing for appropriate use. Appropriate uses are those that require, yet do not degrade the wilderness environment and include recreation, scientific inquiry, education, and historical use.

#### **Alternative 1: The Preferred Future.**

Actions described in the proposal are consistent with both the Wilderness Act and NPS management policies, and maximize protection of wilderness resources and values. There would be no direct adverse effect on wilderness since all proposed developments, such as those planned for the Twin Peaks and Lukeville areas, as well as pullouts and waysides along the State Route 85 road corridor, expansion of the Alamo Canyon campground, and establishment of a new parking lot at Quitobaquito, would occur outside wilderness boundaries. However, there may be indirect effects on wilderness attributes due to the proximity of these developments to designated wilderness and anticipated increases in visitation. Although solitude and visual quality may be compromised in some areas, actions would be taken within the built environment to minimize adverse effects on the wilderness setting including the use of native colors, non-reflective building materials, applying the more restrictive Pima County Lighting Code, and landscaping with native vegetation to create visual barriers. Whereas lowering the speed limit and maintaining the width of State Route 85 would be more compatible with the park's wilderness character, the noise and visual (including light) pollution generated by the continued presence and anticipated increase of non-monument traffic on the roadway, both commercial and

recreational, would have indirect, negative impacts on the monument's wilderness values.

Other proposed actions would enhance protection of wilderness resources and attributes by eliminating or minimizing human intrusions. These actions include (a) undergrounding 27 miles of overhead powerlines adjacent to State Route 85 between the north boundary and Lukeville, (b) reclassification of the monument's airshed from class II to class I (which would impose more stringent air quality standards), (c) formulation of an aircraft monitoring and management plan that would establish procedures for working with the military to minimize noise and visual impacts of aircraft overflights on the wilderness setting, and (d) establishment of maintained trails and continued use of unmaintained trails that would facilitate wilderness access, yet create minimal resource impacts by channelling use along a narrow corridor.

Additional actions proposed under this alternative would have a direct, beneficial impact on the Organ Pipe Cactus Wilderness by increasing the amount of land that qualifies as wilderness. Upon removal of incompatible conditions and restoration of sites to natural conditions, approximately 605 acres along the existing powerline corridor and 23 acres currently occupied by the parking lot and entrance road at Quitobaquito would be eligible for wilderness designation. Furthermore, once land exchanges between the NPS and the Tohono O'odham Indian Nation were completed, an additional 677.1 acres along the western edge of the Gunsight Hills north of Kuakatch Wash and 825.5 acres lying west of the crest of the Sierra de Santa Rosa would qualify as wilderness. The above actions have the potential to increase the size of the Organ Pipe Cactus Wilderness by approximately 2,130 acres.

NPS management policies state that each park containing wilderness will develop and maintain a wilderness management plan to guide the preservation, management and use of that wilderness. The monument's NCRMP contains a project statement that addresses the

## *Environmental Consequences*

need to develop and implement such a plan. Formulation of a wilderness management plan would have a positive effect on the Organ Pipe Cactus Wilderness by providing a framework for analyzing visitor impacts and management actions on wilderness resources, values, and experiences; assess resource conditions and long-term trends; and promote and protect the wilderness setting.

**Conclusion.** Actions described in the proposal maximize protection of the Organ Pipe Cactus Wilderness. Because all proposed developments would occur outside wilderness boundaries, there would be no direct adverse effect on wilderness resources and values. However, wilderness attributes such as solitude and scenic quality may be compromised due to the proximity of human intrusions to designated wilderness. Many of the proposed actions would enhance protection of wilderness resources and attributes by eliminating or minimizing intrusions and increasing the acreage that qualifies as wilderness. Under this alternative, an additional 2,130 acres would be eligible for inclusion in the Organ Pipe Cactus Wilderness.

### **Alternative 2: Continuation of Existing Conditions**

Although less development would occur under this alternative, impacts on wilderness resources and values would be the same as those described for Alternative 1. However, no additional land would be eligible for inclusion in the wilderness designation because access to the Quitobaquito area would remain unchanged, the powerlines would not be relocated, and the land exchange with the Tohono O'odham would not occur. The existing speed limit of 55 miles per hour along State Route 85 would also remain, degrading the park's wilderness values and endangering wildlife.

**Conclusion.** Actions described under this alternative would also maximize protection of wilderness resources and values, and eliminate or minimize human intrusions. However, there would be no additional acres which would be eligible for wilderness designation.

## **IMPACTS ON AIR QUALITY**

Several pieces of federal legislation, most notably the NPS Organic Act (1916) and the Clean Air Act (1977), provide the NPS with the authority to manage air quality within NPS areas. Furthermore, the importance of protecting a park's air quality-related values, including its scenic resources, is often recognized in a park's enabling legislation. Because of its importance to human and environmental health, visitor enjoyment, and scenic quality, the NPS is committed to protecting and enhancing air quality-related values from the adverse effects of air pollution. At Organ Pipe Cactus NM, the ability to view a clear night sky as well as to see across vast distances of the desert landscape constitute prime air quality-related values that require safeguarding.

### **Alternative 1: The Preferred Future**

Redesignation of the monument from a class II to a class I airshed would provide maximum protection of the monument's air quality-related values. Under the class I designation, increment levels for various pollutants such as sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), and particulate matter would be lowered from those levels currently permissible under the class II designation. The state of Arizona would also be required to notify the NPS of all new pollution sources that could potentially impact the monument, as well as allow for NPS involvement in state and local permitting decisions. Moreover, the class I designation would empower the park superintendent with an affirmative responsibility to protect the monument's air quality-related values including its vegetation, scenic vistas, and visibility. However, the U.S. would have no regulatory authority over foreign sources. Despite the more stringent air quality standards that would be imposed on the monument, the class I designation alone would be insufficient in preventing further air quality degradation or visibility impairment from sources outside the U.S. Future increases in airborne pollutants from urban, industrial, and agricultural enterprises in northern Sonora could potentially have an adverse impact on the monument's air quality-related values.

Actions described in the proposal are expected to generate minor amounts of airborne pollutants resulting in a temporary, localized, and insignificant degradation of monument air quality. Automobile emissions, from both recreational and commercial traffic, could be expected to remain about the same or increase slightly along the State Route 85 road corridor. Localized dust generated by vehicle use on unpaved roads is expected to remain at existing levels. Both these sources would have a slight, but insignificant impact on the monument's overall air quality.

Dust and equipment emissions produced during construction activities could be expected to cause a temporary degradation of air quality in the immediate vicinity of construction sites. To partially mitigate these impacts, bare soil would be dampened during construction to reduce dust levels. Wherever possible, disturbed areas would be revegetated with native plants to stabilize soils, decreasing the amount of dust produced by wind erosion. Air quality conditions existing prior to construction could be expected to return following completion of construction activities.

Other potential in-park sources of pollution include wildfires, prescribed natural fires (pending an approved fire management plan), and campfires (charcoal fires) in the Twin Peaks and Alamo Canyon campgrounds. Each of these sources occurs too infrequently or is too localized and short-lived to have any significant impact on the monument's air quality-related values.

As called for in the NCRMP, a comprehensive air quality monitoring program would be implemented to ensure maximum protection of the monument's air quality-related values, and to verify that federal pollution control standards are not being exceeded. This program would entail inventory and monitoring of air quality-related values (including visibility), evaluating air pollution impacts, and collecting baseline and trend data on pollutants such as ozone and sulfur dioxide. Establishment of a comprehensive air quality monitoring program would have a positive affect on the monument's overall air quality and air quality-related values. Such a program would enable the NPS to monitor changes in air quality more closely and accurately, as well as providing data that

could defend a reduction in current or potential air pollution levels based on known impacts to monument resources.

**Conclusion.** In-park sources of pollution are expected to generate minor amounts of airborne pollutants resulting in a temporary, localized, and insignificant degradation of monument air quality. Redesignation of the monument from a class II to class I airshed would provide maximum protection of the monument's air quality-related values. These changes toward a more stringent air quality standard and implementation of a comprehensive air quality monitoring program are particularly important because there is little control or method for preventing further air quality degradation or visibility impairment from foreign sources. Such sources could potentially have an adverse impact on the monument's air quality-related values.

#### **Alternative 2: Continuation of Existing Conditions**

Impacts on the monument's air quality and air quality-related values would be the same as those described under Alternative 1.

**Conclusion.** In-park sources of pollution are expected to generate minor amounts of airborne pollutants resulting in a temporary, localized, and insignificant degradation of monument air quality. Redesignation of the monument from a class II to class I airshed would provide maximum protection of the monument's air quality-related values. However, despite more stringent air quality standards and implementation of a comprehensive air quality monitoring program, these actions would be insufficient in preventing further air quality degradation or visibility impairment from foreign sources. Such sources could potentially have an adverse impact on the monument's air quality-related values.

## **IMPACTS ON FLOODPLAINS, WETLANDS, AND WATER RESOURCES**

The Federal Water Pollution Control Act, as amended, directs the NPS to comply with state laws for water quality management and to meet certain water quality standards, regardless of jurisdictional status of park lands. Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) require all federal agencies to enhance or restore floodplain and wetland values, to avoid development in floodplains and wetlands when practicable alternatives exist, and to mitigate adverse impacts if a floodplain or wetland will be occupied or modified. NPS Management Policies (1988) and the Floodplain Management (1993) and Protection of Wetlands (1977) Guidelines reiterate the importance of safeguarding floodplain and wetland values and provide agency-specific guidance for complying with the above executive orders.

### **Alternative 1: The Preferred Future**

Actions described in the proposal comply with all applicable federal and state laws as well as NPS management policies and guidelines. All proposed developments, including those planned as part of the Twin Peaks, Quitobaquito, and Lukeville DCPs, in addition to pullouts and waysides along the State Route 85 road corridor and expansion of the Alamo Canyon campground would occur outside regulatory floodplains. Because implementing the proposal would have no effect on floodplains within the monument, a statement of findings to comply with Executive Order 11988 will not be necessary.

Quitobaquito is the only wetland environment within the monument that would be impacted by actions outlined in the proposal. The establishment of a well-defined trail network and viewpoints around the pond and immediate vicinity would have a positive impact on wetland functions and values. By encouraging visitors to remain on established trails, vegetation trampling along the edges of the pond and associated springs and channel would be reduced, if not eliminated. Such actions would enhance habitat values of the pond's littoral (shallow) zone, producing a beneficial effect on the many species of wildlife that forage, nest, or seek protective cover in the

stands of bulrush that line the banks. Since implementation of the general management plan is not expected to result in adverse impacts to wetland functions and values, a statement of findings to comply with Executive Order 11990 will not be prepared.

Actions contained in the proposal would have no effect on either surface or groundwater quality. Because the number of staff to be housed at the monument would increase under this alternative, there would be a slight to moderate increase in water consumption over existing levels. However, to conserve water, the NPS would implement a water conservation plan that would be developed in consultation with the NPS Water Resources Division and outside specialists.

**Conclusion.** Actions contained in the proposal would have no effect on regulatory floodplains or surface and groundwater quality. Pending implementation of conservation measures, there would be only a slight increase in water consumption over existing levels. Establishment of a well-defined trail network at Quitobaquito would have a positive impact on wetland functions and values by decreasing, if not eliminating, vegetation trampling along the edges of the pond, springs, and channel. The resultant enhancement of habitat values along the pond's littoral zone would have a direct, beneficial effect on the many species of wildlife that forage, nest, or seek protective cover in this area.

### **Alternative 2: Continuation of Existing Conditions**

As with Alternative 1, actions described under this alternative would have no effect on floodplains within the monument since all proposed development would be located outside regulatory floodplains. Since no improvements would be made to the trail network in the Quitobaquito area, vegetation trampling along the edges of the pond and channel would continue during periods of high visitation (late October-mid-April). However, some vegetation recovery could be expected during the summer months when few visitors frequent the area.

Persistent disturbance to the stands of bulrush in the pond's littoral zone would have a negative impact on the wetland's function and value as wildlife habitat. Continued trampling of the bulrush stands would cause a degradation in habitat quality by impeding wildlife movements, impairing water quality, reducing the amount of protective and nesting cover available, and potentially causing a decline in available forage.

Although no additional employees would be housed at the monument under this alternative, the proposed increase in staffing levels would cause a slight, albeit insignificant, increase in water consumption over existing levels (as with Alternative 1, conservation measures would be implemented to minimize use). All other impacts on the monument's water resources would be the same as those described for Alternative 1.

**Conclusion.** Implementing this alternative would have no effect on floodplains and would result in only a slight increase in water consumption over existing levels. A lack of improvements to the trail system at Quitobaquito would allow for continued vegetation trampling, creating a potentially adverse impact on the wetland's function and value as wildlife habitat.

#### **IMPACTS ON THREATENED, ENDANGERED, AND SENSITIVE SPECIES**

Section 7 of the Endangered Species Act (1973), as amended, prohibits federal agencies such as the NPS from implementing any action that is likely to jeopardize the continued existence of a federally listed (i.e., endangered, threatened) species. Furthermore, the act requires that the NPS consult with the Fish and Wildlife Service on any action it authorizes, funds, or executes that could potentially affect a protected species or its designated critical habitat. To help meet its responsibilities under the Act, the NPS has initiated consultation with the USFWS to identify those listed plant and animal species that may occur within Organ Pipe Cactus NM (Appendixes C, D, and G).

To minimize the potential for adverse effects on listed species, qualified park personnel would

survey areas proposed for development prior to undertaking any actions outlined in the general management plan. If threatened or endangered species are determined to be inhabiting such sites, the NPS would consult with the USFWS to determine appropriate mitigation measures to avoid adverse impacts.

#### **Alternative 1: The Preferred Future**

All of the actions proposed under this alternative are expected to have either no effect, a beneficial effect, or are not likely to adversely affect any species of concern. Of the threatened, endangered, and candidate species known to occur within the monument (Table 2 in Appendix C and Table 4 in Appendix D), as well as the plant and wildlife species of special concern, only the lesser long-nosed bat, Mexican rosy boa, Quitobaquito desert pupfish, Quitobaquito snail, and Sonoran mud turtle may be impacted by actions described in the proposal. Although none of these species would experience a direct loss of habitat, each could potentially be affected by human-induced disturbance, mortality, or habitat degradation.

At Quitobaquito, the establishment of well-defined trails and viewing areas around the pond would have a beneficial effect on habitat for the Sonoran mud turtle, Quitobaquito snail, and Quitobaquito desert pupfish. By encouraging visitors to remain on established trails, there would be a reduction and possibly an elimination of vegetation trampling along the pond's littoral zone. This highly productive zone, dominated by stands of bulrush and submerged aquatic vegetation, is rich in invertebrates and provides protective cover, along with important foraging, spawning, and resting areas for the above mentioned species.

Expansion of the Alamo Canyon campground would have no direct effect on any listed or sensitive species of concern. However, the desirability of this remote setting, together with the ability to accommodate an increased number of campers, may encourage more prolonged visitor stays in the area. These actions could potentially impact the largest known maternity colony of the endangered lesser long-nosed bat in the U.S. Because features such as mine adits are attractive destinations for hikers, there is a possibility that

## *Environmental Consequences*

increased human presence in the area could lead to increased disturbance at the roost site. Such disturbance could have potentially adverse effects on the species' survival if it resulted in abandonment of the site or a decline in juvenile survivorship or recruitment.

Of all the threatened, endangered, and sensitive species known to occur at Organ Pipe Cactus NM, only the Mexican rosy boa has experienced a human-induced population decline within the monument. This snake has been adversely impacted by highway mortality along State Route 85. The rocky outcrops that lie on both sides of the road at Eagle's Pass (milepost 66.0) represent one of the few areas of potential rosy boa habitat along the road corridor. Although the proposed pullout and trail would encroach on this habitat, there would be little, if any, direct effect on this rare snake since highway mortality has long since decimated the rosy boa population at this location. Because this snake appears to be strongly impacted by highway mortality, the continued use of the roadway by large volumes of traffic, travelling at excessive speeds, can be expected to eventually eliminate the rosy boa from all areas bordering State Route 85. In contrast, the low speeds and infrequent traffic volume experienced on dirt roads throughout the monument appears to have an insignificant effect on this species.

As long as a demand exists on the black market, the monument's rare cacti and reptiles will continue to be sought after by poachers. As stated in the NCRMP, a study would be undertaken to determine the extent and most effective ways to deal with poaching. The proposed increase in the monument's law enforcement staff, together with increased patrol efforts in known problem areas, would make positive strides in combatting the problem. In turn, such actions would aid in preserving the monument's biodiversity, population levels, and species interrelationships.

**Conclusion.** The lesser long-nosed bat, Mexican rosy boa, Quitobaquito desert pupfish, Quitobaquito snail, and Sonoran mud turtle would be the only threatened, endangered, or sensitive species to be impacted by actions contained in the proposal. Although none of these species would

experience a direct loss of habitat, each could potentially be affected by human-induced disturbance, mortality, or habitat degradation. The establishment of a well-defined trail system at Quitobaquito would have a beneficial effect on habitat for the Sonoran mud turtle, Quitobaquito snail, and Quitobaquito desert pupfish by eliminating vegetation trampling along the pond's littoral zone. Expansion of the Alamo Canyon campground could have potentially adverse effects on the lesser long-nosed bat if increased human presence in the area leads to increased disturbance at the roost site. Because the rosy boa is strongly impacted by highway mortality along State Route 85, continued use of the roadway by large volumes of traffic travelling at excessive speeds could be expected to eventually eliminate the rosy boa from this road corridor. The proposed increase in law enforcement personnel, coupled with increased patrol efforts in known problem areas, is expected to make positive strides in combatting the monument's poaching problem.

### **Alternative 2: Continuation of Existing Conditions**

Actions described in this alternative have the potential to adversely affect populations of the Mexican rosy boa along the State Route 85 road corridor, the monument's only known population of the Sonoran mud turtle, and the only known, naturally-occurring populations of the Quitobaquito desert pupfish and Quitobaquito snail. There would be no effect on any other species of concern.

Of the species to be adversely affected, all but the Mexican rosy boa are known to occur only at Quitobaquito. Each of the Quitobaquito species is sensitive to habitat modification and may be adversely affected by continued disturbance and trampling of aquatic vegetation (primarily bulrush) along the edges of the pond, springs, and channel. Ongoing disturbance of these shallow water environments throughout most of the year would be expected to have a negative impact on foraging, spawning, and resting areas for these species. Such disturbance appears to already have had an adverse effect on the Sonoran mud turtle

population which is declining and may face extirpation. Even more dire consequences may be faced by the Quitobaquito snail and Quitobaquito desert pupfish whose continued existence as a species and subspecies, respectively, may be jeopardized.

Under this alternative, highway mortality of the Mexican rosy boa would remain severe since there would be no anticipated decrease in the amount, speed, or types of traffic using State Route 85. Consequently, as with Alternative 1, human-induced mortality could be expected to eventually eliminate this species from all areas along the road corridor. Because no new developments are proposed along State Route 85, there would be no additional loss of rosy boa habitat.

Since existing staff levels and patrol efforts would remain the same, little, if any significant progress would be made to combat poaching. However, because a study would be implemented to determine the extent and most effective ways of dealing with the problem, efforts would be better directed.

**Conclusion.** Of the monument's threatened, endangered, and sensitive species, only the Mexican rosy boa, Sonoran mud turtle, Quitobaquito desert pupfish, and Quitobaquito snail would be impacted by actions described in this alternative. All but the rosy boa occur only at Quitobaquito and would be adversely affected by continued disturbance and trampling of the pond's littoral zone, an area that provides important foraging, spawning, and resting habitat. The Sonoran mud turtle population is already declining and may face extirpation; the continued existence of the Quitobaquito snail and Quitobaquito desert pupfish may also be threatened. Despite no additional loss of habitat along State Route 85, current traffic levels and speeds would continue to have an adverse effect on the Mexican rosy boa, eventually eliminating all populations of this snake from the road corridor. Although patrol efforts of existing staff may be better directed, there would be little, if any significant progress made to combat poaching.

## **IMPACTS ON VEGETATION AND SOIL**

The management policies of the NPS strive to maintain the native flora of park areas, allowing vegetation to be manipulated only where necessary to achieve park management objectives. To date, the monument's vegetation program has emphasized research, control of non-native species, and rehabilitation of previously disturbed sites.

To mitigate construction-related impacts on the monument's flora, areas near developed sites would be revegetated and restored to natural conditions. Disturbed sites would be revegetated with native plant materials (e.g., seeds, transplanted vegetation) salvaged from areas impacted by construction. To guide restoration efforts, the NPS would develop a site-specific revegetation plan that outlines procedures for collecting and propagating native species, salvaging topsoil, site grading and soil preparation, erosion control, re-establishment of native vegetation, and post-construction monitoring. The use of native vegetation for landscaping around developed areas would not only provide an attractive setting, but would also help screen the built environment from visitor use areas.

### **Alternative 1: The Preferred Future**

Actions described in the proposal would disturb or remove soil and native vegetation from approximately 58 acres, causing no significant impact on the monument's floral diversity. Because much of the ground surface is composed of loose rock and bare soil, the proposed actions would have an insignificant increase on the amount of soil subject to erosion. Virtually all of the vegetation to be removed is representative of the mixed Sonoran desertscrub plant community and is characterized by paloverde, organ pipe and saguaro cactus, ocotillo, bursage, brittlebush, and creosotebush. Most disturbance would occur on previously impacted sites or near developed areas, and would be offset by revegetation of 229 acres, for a net increase of approximately 171 acres of desert flora.

The establishment of pullouts, waysides, and parking areas along State Route 85 would help discourage the continued proliferation of undesignated pullouts and associated vegetation

## *Environmental Consequences*

disturbance along the road corridor. Because most pullouts would be located in denuded areas, fewer than five acres of vegetation would be removed. By limiting the locations where vehicles would be permitted to park, there would be an anticipated increase in the amount of vegetation bordering the road. Previously disturbed sites would be revegetated or left to recover naturally.

Expansion of the Alamo Canyon campground would involve less than two acres of soil and vegetation disturbance. Affected vegetation would include the dominant ground cover of triangle-leaf bursage and creosote, along with paloverde, saguaro and organ pipe cactus, cholla (*Opuntia* spp.), prickly pear, and mesquite. Campsites would be situated to avoid the removal of large columnar cacti. Because the proposed parking area would be located within the existing roadprism, no additional vegetation disturbance would be necessary for its construction.

Under the proposal, most vegetation impacts would occur within the Twin Peaks non-wilderness, development area zone. Although the exact location of building footprints would be determined at the comprehensive design stage, whenever possible, buildings would be located on previously disturbed sites and would not intrude on riparian areas. Construction of the new visitor center, parking lot, picnic area, science and resources management center, greenhouse, nursery, and road network would occur in the vicinity of the existing visitor center, an area dominated by creosote and bursage, interspersed with paloverde, saguaro, chainfruit cholla (*Opuntia fulgida*), and ocotillo. Approximately ten acres of native desert flora would be affected by the above construction.

The construction of the two new apartment buildings and the community center within the existing housing area would disturb as much as 25 acres of mixed Sonoran desertscrub vegetation. To minimize the effects of such disturbance, all new construction (with the exception of the new community center, which would be located primarily on a previously impacted site) would take place within the confines of the loop drive, proximate to the road and existing structures.

In the Twin Peaks campground, enlargement of the amphitheater parking area would disturb less than 0.5 acre of bursage and creosote, the predominant ground cover. Expansion of the campground by 20 sites would involve an additional four to five acres of vegetation disturbance. However, since access to these campsites would be limited to foot traffic, each site could be situated so as to minimize the removal of mature trees, shrubs, and columnar cacti.

The remaining development proposed for the Twin Peaks area would be located in the vicinity of the existing maintenance complex, on sites dominated by creosote and bursage. Because most of the area surrounding these structures has been previously disturbed (evidenced by the presence of weedy species such as desert broom (*Baccharis sarothroides*), expansion of this facility would involve little additional ground disturbance (less than five acres). The proposed helicopter pad, ranger operations and fire station, and turnaround for the Puerto Blanco Drive, all of which would be located within the general area, would further impact approximately five acres. (Exact location of the turnaround would be determined during the comprehensive design stage; however, the road would be aligned so as not to intrude on riparian areas.)

At Quitobaquito, the development of a new parking area along Puerto Blanco Drive would necessitate the removal of less than one acre of vegetation. However, this loss would be countered by the elimination and subsequent revegetation of the existing entrance road and parking area, resulting in a net gain of roughly 23 acres of native desert flora. An additional 605 acres along State Route 85 would be restored to natural conditions following burial of the overhead powerline.

The establishment of approximately 30 miles of designated trails, including those at Quitobaquito, would have a slight, beneficial effect on monument flora. The rocky substrate and discontinuous ground cover would permit trails to be routed around much of the larger vegetation, minimizing the amount of shrubs, trees, and cacti requiring removal. Incorporating existing social trails into the trail network, wherever possible, would further minimize vegetation loss. By channeling use

along well-defined trails, vegetation trampling would also be reduced.

Although non-native species, particularly weeds and grasses, could be expected to invade disturbed sites, the consequences of such actions on the native flora are presumed to be minor since many of these species, particularly grasses, are already naturalized and widespread throughout developed areas of the monument. However, to further decrease the opportunity for non-natives to become established, revegetation activities would take place on disturbed sites immediately following construction, and the establishment of lawns within the Twin Peaks area would be discouraged.

**Conclusion.** Actions described in the proposal would have no significant impact on the monument's floral diversity or the amount of soil subject to erosion. Most disturbance would occur on previously impacted sites or near developed areas. The disturbance or loss of primarily Sonoran desertscrub vegetation from approximately 58 acres would be offset by revegetation of 229 acres, for a net increase of about 171 acres of desert flora. Although non-native species, particularly weeds and grasses, could be expected to invade disturbed sites, the consequences of such actions on the native flora are presumed to be minor since many of these species, particularly grasses, are already naturalized and widespread throughout developed areas of the monument.

#### **Alternative 2: Continuation of Existing Conditions**

As with Alternative 1, there would be no significant impact on the monument's floral diversity or the amount of soil subject to erosion, although fewer acres of Sonoran desertscrub vegetation would be directly impacted by construction (5 acres would be impacted instead of 58 acres). However, this loss would be offset by the revegetation of 229 acres, for a net gain of approximately 224 acres of desert flora. Unlike the above alternative, the lack of a well-defined trail network at Quitobaquito and the persistence of undesignated pullouts along State Route 85 would continue to promote vegetation

disturbance in these locales. All other soil and vegetation-related impacts would be the same as those predicted for Alternative 1.

**Conclusion.** As with Alternative 1, there would be no significant impact on the monument's floral diversity or the amount of soil subject to erosion. Soil and vegetation would be disturbed or removed from approximately five acres of the monument. The lack of a well-defined trail network at Quitobaquito and the persistence of undesignated pullouts along State Route 85 would continue to promote vegetation disturbance in these areas.

#### **IMPACTS ON WILDLIFE**

In accordance with its Organic Act and management policies, the NPS would seek to protect and perpetuate the native fauna within NPS areas. Management emphasis focuses on maintaining genetic diversity, allowing natural processes to regulate populations, and minimizing human influences. As stated in NPS Management Policies (1988), the wildlife of Organ Pipe Cactus NM will be protected against harvest, removal, destruction, harassment, harm, or other human-induced impacts.

#### **Alternative 1: The Preferred Future**

Since all proposed actions would occur in areas already experiencing human intrusions, there would be little, if any, effective loss of wildlife habitat. Noise and human activity, coupled with the previously disturbed nature of such sites makes it highly unlikely that wildlife would be further impacted by additional development, particularly in the Twin Peaks or Lukeville areas. Most animals, especially large mammals, already avoid areas of human habitation. Those that do inhabit such locations tend to be opportunistic and already accustomed to human disturbance. To minimize the potential for adverse effects on wildlife in the area, an attempt would be made to schedule construction activities so that they did not interfere with breeding, nesting, or parturition.

Some forms of wildlife, particularly non-native avian species, thrive in human-modified environments because of their dependence on

## *Environmental Consequences*

human habitats and food sources, or by outcompeting native species. The European starling, house sparrow, and rock dove are already permanent residents in the monument's developed areas and would continue to flourish in the built environments around Twin Peaks and Lukeville. The presence of human-provided water sources in these areas may be supporting artificially high populations of some species. Consequently, the ongoing elimination of these unnatural water sources, particularly in the Twin Peaks area, could potentially reduce populations of some native and non-native species to more natural levels. It may also decrease the attractiveness of such areas to colonies of the Africanized honey bee.

The establishment of a trail network at Quitobaquito would have a beneficial effect on wildlife that use the area by minimizing the amount of aquatic vegetation that is trampled along the edges of the pond. Species that would experience the greatest benefits are those that forage, nest, or seek protective cover in the stands of bulrush along the pond's littoral zone. Wildlife that would directly benefit from such actions include numerous species of birds and invertebrates, the locally rare Sonoran mud turtle, and endemic species such as the Quitobaquito snail and Quitobaquito desert pupfish.

The presence of non-monument traffic on State Route 85 continues to pose the greatest threat to the monument's fauna. Under the proposal, high mortality rates would persist along State Route 85, the result of large volumes of traffic travelling at excessive speeds, both day and night. Such actions would continue to ravage all forms of wildlife (e.g., snakes, birds, rodents, canids, ungulates) that traverse or inhabit areas along this 27-mile road corridor, including many rare and sensitive species. Highway mortality has the potential to eliminate some species from this portion of their range as well as reduce faunal diversity, genetic variability, and population levels within the monument. It may also affect species' interrelationships, particularly those between predator and prey.

**Conclusion.** Proposed developments would result in little additional loss of habitat or disturbance to wildlife. An attempt would be made to schedule construction activities

so they did not interfere with breeding, nesting, or parturition. Non-native avian species would continue to flourish in built environments, although the ongoing elimination of human-provided water sources may reduce populations of both these and native species to more natural levels. It may also decrease the attractiveness of such areas to the Africanized honey bee. At Quitobaquito, enhanced protection of the pond's littoral zone would have a beneficial effect on wildlife that forage, nest, or seek protective cover in the stands of bulrush that border the pond. The presence of non-monument traffic on State Route 85 would continue to pose a serious threat to the monument's fauna. High mortality rates would be expected to persist along this road, decimating all forms of wildlife, and potentially eliminating some species from this portion of their range. Highway mortality could also be expected to reduce faunal diversity, genetic variability, and population levels, and may affect species' interrelationships, particularly those between predator and prey.

### **Alternative 2: Continuation of Existing Conditions**

Impacts on the monument's fauna would be the same as those described under Alternative 1, with the exception of those impacts predicted for wildlife inhabiting the shallow water environment at Quitobaquito. Because wetland environments are extremely rare within the monument, continued trampling and disturbance of the pond's littoral region would degrade the habitat values of this nutrient-rich and highly productive zone by causing a potential decline in the amount of forage, nesting, and protective cover available, as well as impeding movements and impairing water quality.

**Conclusion.** Proposed developments would result in little additional loss of habitat or disturbance to wildlife. An attempt would be made to schedule construction activities so they did not interfere with breeding, nesting, or parturition. Non-native avian species would continue to flourish in built environments, although the ongoing elimination of human-provided water

sources may reduce populations of both these and native species to more natural levels. It may also decrease the attractiveness of such areas to the Africanized honey bee. At Quitobaquito, continued disturbance to aquatic vegetation along the pond's littoral zone would degrade the quality of this area as foraging and nesting habitat and protective cover. The presence of non-monument traffic on State Route 85 would continue to pose a serious threat to the monument's fauna. High mortality rates would be expected to persist along this road, decimating all forms of wildlife, and potentially eliminating some species from this portion of their range. Highway mortality could also be expected to reduce faunal diversity, genetic variability, and population levels, and may affect species' interrelationships, particularly those between predator and prey.

#### IMPACTS ON CULTURAL RESOURCES

The National Parks Act of August 25, 1916, the Antiquities Act of 1906, National Environmental Policy Act of 1969, and the National Historic Preservation Act of 1966, mandate preservation and protection of cultural resources. Section 106 of the National Historic Preservation Act, as amended, requires Federal agencies to take into account the effect of actions on cultural resources. Executive Order 11593, "Protection and Enhancement of the Cultural Environment," further directs the NPS to have all areas proposed for development, surveyed by an archeologist to ensure that such resources are not inadvertently damaged. All potentially significant cultural resources sites are evaluated in consultation with the State Historic Preservation Officer to determine their eligibility for listing in the National Register of Historic Places. The Native American Graves Protection and Repatriation Act of 1990 provides protection for Native American graves on federal lands and requires federal institutions to return important communally owned artifacts and sacred objects that were improperly acquired.

#### Alternative 1: The Preferred Future

**Prehistoric, Historic, and Ethnographic Resources.** Several actions identified in this alternative would bring about a more systematic treatment of cultural resources—prehistoric, historic, and ethnographic—and would have a beneficial impact. Cultural resources management ideals and practices would receive greater recognition in the park and knowledge of past use of the land would increase as research efforts are initiated or expanded.

Preservation of significant resources, including places sacred to the Tohono O'odham Nation, would be enhanced by increasing research and stabilization efforts and implementing more interpretation. Treatment for historic preservation would be prioritized and would be applied systematically and consistently under the proposed action. The treatment would especially benefit those cultural resources that are not currently being studied or stabilized, and which are possibly deteriorating. Added interpretation of significant cultural resources, with Tohono O'odham consultation for ethnographic resources, would be an indirect benefit, helping increase visitor understanding and awareness of these resources and the role of the park in preserving them.

Establishing a Memorandum of Understanding and continued participation in ISDA would help to improve the park's relationship with the neighboring Tohono O'odham and Hia-Ced O'odham. The protocol would also aid the park in increasing its understanding of the Tohono O'odham's and Hia-Ced O'odham's relationship to the land. This increased understanding would allow the park to protect sacred sites and significant resources by applying appropriate treatment measures such as avoidance, interpretation, visitor use, or research of these areas.

Continued and increasing public use within the park will be a detrimental impact to cultural resources, which are vulnerable to vandalism or inadvertent damage. This damage can sometimes lead to the destruction or removal of irretrievable resources. Actions to reduce these types of impacts would include increased ranger patrols, resource monitoring to detect vandalism and illegal collection, education of visitors about the significance of the park's

## *Environmental Consequences*

cultural resources and the need to protect them, and education of local and regional residents on both sides of the international border. In addition, the park would sponsor a volunteer unit as part of the Arizona Site steward program, to regularly monitor culturally significant sites.

The redesign of visitor access to Quitobaquito Springs could help manage visitor use and reduce impacts to historic and archeological resources. Increased patrols at places like Quitobaquito and Dos Lomitas Ranch, should reduce vandalism and inadvertent damage to cultural resources. Increasing patrols together with extensive educational programs are imperative to mitigating these impacts.

**Archeological Resources.** To ensure protection of any unknown cultural resources, archeological surveys would be conducted for all lands that could be affected by development proposals prior to the time in which those proposals were implemented. Surveys of each entire area would be performed to develop a complete baseline understanding of each area's significance. In addition, monitoring protocols would be established and monitoring would be undertaken prior to and would continue throughout construction activities. If archeological sites were found during the surveys, impact to them could be mitigated by avoidance. If avoidance is not feasible, any potentially adverse effects would be mitigated by data recovery and actions developed in consultation with the State Historic Preservation Officer, the Advisory Council on Historic Preservation as stipulated in 36 Code of Federal Regulations, Part 800, and, where appropriate, the neighboring American Indian groups.

Several new developments are proposed in Twin Peaks, Alamo Canyon, Quitobaquito, and road and trail corridors that could impact prehistoric and historic archeological resources. Potential impacts and the archeological surveys performed to date are discussed for each area.

*Twin Peaks.* A number of small-scale surveys associated with various construction projects have been conducted yielding one archeological site and a number of isolated artifacts. Because these surveys did not cover all of the areas that might be affected by proposed development,

more surveys are needed before the new facilities could be constructed. The new facilities are not expected to cause a significant impact on archeological resources since most of the facilities occur in already disturbed areas. Impacts on these and other areas would be avoided where possible, or mitigated through data recovery.

*Alamo Canyon.* A survey of the middle and upper bajada around Alamo Canyon revealed a high density of archeological resources. The existing campground was located in a large archeological site before it was common for federal agencies to survey for cultural resources before construction. Only recently was the area found to contain extensive artifact scatters.

The site would be recorded prior to any alteration within the current campground boundaries. Based on the results of an initial survey, the new campsites could be relocated to ensure that archeological sites will not be directly disturbed. Under this alternative, the archeological resources could continue to be indirectly affected by human use of this area. More people using the additional campsites could add to the existing impact, but is relatively insignificant compared to the existing use the area gets during the day. The new parking lot will be developed within the area now used for parking and is only expected to manage existing use patterns, not increase use in this area.

The archeological significance of this area and the ability of the resources to withstand use would be factored into calculation of its capacity to withstand day and overnight use. When the park determines this capacity, use of the entire area may be changed to ensure adequate protection for resources.

*Quitobaquito Springs.* Several changes are slated for the Quitobaquito area, which could impact the eastern and western slopes and basins of the Quitobaquito Hills. The eastern slope was surveyed in 1989 and several sites were recorded. Some of these sites are in poor condition due to sheetwash erosion of the lower bajada slope. The Quitobaquito basin was surveyed in 1993 and 16 sites were recorded. Sites span the range of time from Paleoindian through historic Hia-C'ed O'odham, Anglo, and Mexican use of the area. The springs are sacred

to the Tohono and Hia-C'ed O'odham and water is still collected for ceremonies.

The proposed trails in this area would help control visitor use by directing pedestrian traffic and could reduce indirect, random impacts on archeological resources in this area. Increased visitor use along portions of the historic salt trail may contribute to erosion and possible sheetwash, which could impact archeological resources that may be buried in these areas.

Because of the area's ethnographic importance, consultation with the O'odham would occur during the design stage so that their interests and concerns can be incorporated into the new design and visitor use patterns at Quitobaquito. An archeologist would also work closely with designers and the O'odham to insure that impact to the cultural resources in the area are avoided or minimized. The existing parking lot, new lot, and hiking route will be tested for the presence of intact buried features and any identified features would be preserved.

*Road and Trail Corridors.* No significant impacts are expected to archeological resources along roadways in the park, because no road improvements are proposed outside of the existing disturbed corridors. However, less than two linear miles of roadway in the park have been surveyed to date and it is possible that previously disturbed sites have been bisected by the roads. Before the powerlines are placed underground or other modifications, such as construction of the pull-outs and waysides, were made to State Route 85, or any other roads, archeological surveys, evaluation, avoidance, and if necessary, consultation to determine mitigative measures would be undertaken before the NPS would proceed.

To mitigate potential impacts to archeological sites along trails, the 30 miles of new maintained trails would be staked in the field, surveyed, and relocated if needed. Where these trails follow historic routes, the extant route would be surveyed. Increased visitor use in these areas could cause indirect impacts on archeological resources.

**Conclusion.** Knowledge, protection, and preservation of important cultural resources would primarily be enhanced.

With the system of prescribed treatments, adverse effects from the loss of historic fabric from existing historic sites and structures can be avoided in the future. Increased visitor use could indirectly affect resources by enhancing visitor's abilities to explore more of the park. For Quitobaquito, the new trail system could help control visitor use and reduce current impacts. More archeological surveys of the park would be conducted, improving our understanding of how the park was utilized by prehistoric, historic, and contemporary peoples. The surveys would also mitigate possible impacts from developments, allowing significant areas to be avoided, or their resources recovered and studied.

### **Alternative 2: Continuation of Existing Conditions**

**Prehistoric, Historic, and Ethnographic Resources.** Most of the impacts are the same as for Alternative 1 because of implementation of the NCRMP and prescribed preservation treatments. The chances of random or inadvertent damage or vandalism to cultural resources would still be reduced, but not as much as in Alternative 1, given that the level of on-site patrol, resource monitoring, and education of visitors and local and regional residents would be less for this alternative.

Impacts on cultural resources and vandalism from across the international border would be significantly reduced when the area is staffed during high visitation periods. Existing impacts would continue at current levels during the rest of the year, when the area is not staffed.

**Archeological Resources.** As stated in Alternative 1, archeological surveys would be conducted for all lands that could be affected by specific road construction or development proposals well before those proposals were implemented, to ensure protection of any unknown cultural resources. Approximately five acres in the Twin Peaks area would be disturbed through development proposals in this alternative. Any potentially adverse effects to cultural resources, if avoidance is not feasible, will be mitigated by actions developed in consultation with the State Historic Preservation Officer, and the Advisory Council on Historic Preservation as stipulated in 36

## *Environmental Consequences*

Code of Federal Regulations, Part 800, and, when appropriate, neighboring American Indian groups.

**Conclusion.** Under this alternative, the management, protection, and preservation of important cultural resources would be enhanced, but not to the degree described in Alternative 1.

### **IMPACTS ON VISITOR USE AND EXPERIENCE**

The NPS Organic Act and Management Policies require projections on expected visitor use levels in the park. They also provide for an understanding and protection of the visitor experiences within units of the NPS. Under the mandates of the Architectural Barriers Act of 1968, and the Rehabilitation Act of 1973, and direction from NPS Management Policies, facilities, services, and programs would be as accessible to disabled visitors as feasible.

#### **Alternative 1: The Preferred Future**

**Visitor Use.** Based on past trends, visitation levels are expected to increase. Table 11 in Appendix F shows a ten-year range of projected use based on past visitation (1893–1993) and was developed using SmartForecasts II software. Because visitation has fluctuated in the past ten years, the table shows a range of high and low projected visitation and does not take into account any proposed actions.

Several actions in this alternative would lead to an increase in visitation, however, the extent of that increase can not be predicted. Construction of a new visitor center will offer additional services and amenities in a larger, updated facility. The proposed science and resources management center, greenhouse and nursery will provide opportunities for visitors to understand park research by providing exhibits on revegetation, propagation of desert plants, and other research programs. In addition, accommodations for disabled, visually impaired, hearing impaired, and non-English speaking visitors should attract a larger diversity of visitors who may have been previously unable to access park facilities.

Redesignation of Organ Pipe Cactus National Monument to Sonoran Desert National Park will most likely result in a sudden surge in visitation, especially if the redesignation occurs concurrently with completion of the visitor center. Redesignation of the monument to National Park status could continue to have a minimal long-term effect on increasing annual visitation levels, however, the extent of increased visitation is unknown. Participation with adjacent federal jurisdictions and nations under the guidance of the International Sonoran Desert Alliance (ISDA) may also have a minimal increase on visitation levels by contributing to the recognition of the monument as a significant natural and cultural resource.

The addition of camping sites at Twin Peaks and Alamo campgrounds will have a moderate impact on visitation by accommodating increasing overnight visitor demands. The addition of four primitive camping sites to the four existing sites at Alamo may allow for a minimal increase in wilderness use in this area. The additional campsites may, however, adversely affect visitor's solitude associated with a wilderness experience.

Visitation increases resulting from proposed changes along State Route 85 would be minimal depending on the effects of NAFTA, and to a lesser degree, on the numbers of tourists travelling to bay communities in the Gulf of California. NAFTA is expected to result in an increasing number of commercial and other traffic passing through the monument. Reducing the current speed limit and adding wayside exhibits may capture some travellers passing through the park to other destinations. The reduced speed limit may also have a beneficial impact on visitor safety, encouraging visitors to return for future visits. The increase in visitor safety may be countered, however, by an anticipated increase in heavy truck and commercial vehicle highway volume resulting from NAFTA.

**Visitor Experience.** Actions proposed in the preferred alternative could beneficially contribute to the overall quality of visitor experiences and facilitate visitor interaction with Organ Pipe Cactus NM's special environments and resources. Enrichment of the park's interpretation program, increased trail and primitive camping opportunities, and new

and upgraded visitor service facilities would all enhance the visitor experience.

The enlarged visitor center will allow more visitors to participate in interpretive programs and enjoy interpretive media in an uncrowded, unhurried atmosphere that contributes to learning and comprehension. Accessibility improvements at the center will serve a wider variety of park visitors. Expansion of interpretive themes and updated interpretive media at the new visitor center and throughout the park will improve visitor understanding and appreciation of resources in the park and the Sonoran Desert Region. The park's focus on ecosystems, sustainability, and natural-cultural resource relationships will help communicate environmentally responsible values and may impact visitors' thinking about environmental concerns.

Improved park orientation through signs along State Route 85, waysides, and at the visitor center will help visitors take full advantage of opportunities offered by the park. Visitors will be able to plan their stay more efficiently and effectively.

Proposed new trails will provide visitors many more opportunities to interact with the park environment. Visitors will be able to directly experience resources and plant/animal communities currently not readily available to them. The increase in numbers and varieties of trails could serve to distribute use and help ensure the quiet, low-use experiences many visitors prefer. However, the increase in numbers of visitors using these trails could negatively impact this type of visitor experience.

Increasing the number of primitive camping spaces will respond to visitor demand for this special camping experience.

New emphasis on sustainable facility design and the reduction of "light pollution" and other visual intrusions created by park development will further protect scenic quality and support wilderness values. Lower speed limits and other traffic controls on State Route 85 will help reduce the noise and visual impacts of high speed traffic. This drive would become more of a scenic part of the park visit and would help to create a sense of the park's wilderness character

rather than being merely a transit route to the visitor center or Puerto Penasco, Mexico. Placing powerlines underground would also greatly contribute to the visual quality of the park. Absence of such visual intrusions would improve the view of the wilderness landscape in the park and contribute to the feeling of being in a special and protected environment.

Improvements to State Route 85 could greatly improve visitor safety. Reduced traffic speeds and pull-outs will allow visitors to use interpretive and scenic pullouts and generally enjoy a less hurried experience. Visitors can concentrate more on park resources and less on handling traffic.

Relocation of access and parking for the Quitobaquito area will help insulate visitors from the theft and vandalism that occurs at the existing site. Security systems for all new facilities would also help protect government property from theft.

**Conclusion.** Increased levels of visitation are anticipated based on past trends and implementing actions proposed by the alternative. These actions would also lead to an overall improvement of visitor experiences in the park. Opportunities for understanding the significance of the historic, cultural, and natural values of the park and its part as an international network of public preserves would be improved. New facilities, including trails, could allow visitors to experience uncrowded conditions throughout the monument.

#### **Alternative 2: A Continuation of Existing Conditions**

**Visitor Use.** Projected visitation levels based on past trends (see Table 11) would be the same as for Alternative 1. Other actions in this alternative, are not expected to result in a significant increase in visitation.

A lack of primitive style camping sites in the Twin Peaks and Alamo campgrounds could lead to an increase in visitors camping outside of monument boundaries, or camping illegally within the monument.

## *Environmental Consequences*

As with Alternative 1, NAFTA is expected to result in increased volumes of commercial and other traffic passing through the monument. The proposed construction of additional truck bays at Lukeville to accommodate an anticipated increase in commercial truck traffic may result in increased congestion and safety problems for visitors.

Negative impacts on visitor safety may discourage visitors from making return visits to the monument. Staffing Quitobaquito Springs during high use periods may help alleviate unsafe conditions encouraging more return visits. However, this may be offset by the continued threat to the security of vehicles using the existing parking lot.

**Visitor Experience.** Most visitors currently enjoy high quality experiences in the park, and this would continue under Alternative 2. Enrichment of park interpretive themes would enhance visitor understanding of park resources, as in Alternative 1, but some of the additional benefits of increased and improved visitor facilities would not be achieved under this alternative.

Absence of entrance information and the limitations of the crowded visitor center would continue to inhibit the availability of orientation information to visitors. Some visitors could find it difficult to plan their stay to their best advantage and could miss opportunities because of lack of information.

Even with updated exhibits, the small size of the visitor center would continue to result in periods of crowding and would limit the amount and variety of interpretive media. These limitations would continue to inhibit visitors' access to information and their enjoyment and comprehension of interpretation at the center. Some park resources and plant/animal communities would continue to be inaccessible to many visitors because of the lack of trails to these areas. The existing trails could become more crowded as visitation increases, degrading the experience for many visitors. The visitor demand for additional primitive camping spaces would not be satisfied in this alternative.

Impacts on visual quality and wilderness values would be similar in both alternatives with the

exception of impacts from State Route 85. In this alternative, the noise and visual distractions resulting from high speed traffic would continue to degrade the park's wilderness character and negatively impact visitors' experiences. It is anticipated that these impacts would increase over time as recreational and commercial traffic between the US and Mexico increases as a result of NAFTA.

**Conclusion.** Existing visitor and administrative facilities may be inadequate to provide visitors with a favorable visitor experience. Visitor security problems at Quitobaquito may be somewhat remedied by the presence of daytime personnel and groups of people, however, the long-term effects of vehicle security problems may remain. The effects of heavy truck congestion associated with NAFTA may have a negative long-term impact on visitor use levels by discouraging visitors to return to the monument.

## **IMPACTS ON SOCIOECONOMICS**

As required by NEPA and discussed during public meetings, the socioeconomic impacts caused by implementing management alternatives are analyzed. Economic effects as well as impacts to the general character of the surrounding region are discussed.

### **Alternative 1: The Preferred Future**

The Money Generation Model, prepared by the NPS, Office of Social Science, Socioeconomic Studies Division, was used to estimate the following sales and job benefits, and tax revenues generated from tourism, federal government expenditures, and other park-related expenditures.

Increased visitation levels could result in positive impacts to the region through an increase in tourist-related expenditures for such items as lodging, gas, and food. For example, if visitation increased by 10% over 1993 visitation levels (approximately 25,000 visitors), then the region could expect an annual increase of over \$4 million in sales benefits, \$275,000 in tax revenues, and up to 115 new jobs to the regional economy.

Construction and operating costs, including hiring 36 additional employees, associated with this alternative could provide significant direct and indirect impacts to the local and regional economy. An annual increase in total sales benefits of \$53,100,000, tax revenue benefits of \$3,450,000, and up to 160 new jobs to the region could be expected.

The proposed actions in this alternative related to State Route 85 should not effect regional economies. However, an increase in visitation will cause a direct impact on traffic levels within the monument and along State Route 85. Traffic concerns will be assessed by a proposed inter-agency planning effort to look at alternative ways at reducing current impacts of traffic on the park's resources. The impacts of any alternatives generated during this planning effort would be assessed as part of the plan.

Expanding interpretation of regional significance, the park's involvement in ISDA, and increased awareness of the Man in the Biosphere program, may positively contribute to define and unify surrounding communities as a unique ecological and tri-cultural region. Any visual impacts that may occur as a result of construction proposed in this alternative should not impact the character of surrounding communities. Employees wishing to live in Ajo or Why should have little impact to the character of these communities.

Increased visitation in the monument could indirectly cause a need to expand service facilities in Lukeville. Due to the existing size and development constraints of Lukeville, any development associated with increasing tourist demands could significantly alter the character of this community, and have a severe adverse impact.

**Conclusion.** Increased visitation levels, and construction and operation of facilities in this alternative could provide moderate economic benefits to the local and regional economy. Increased visitation levels would have direct and indirect impacts on sales and tax revenues, and to the creation of jobs in the region. Construction of the proposed facilities should provide short-term benefits to the local and regional economy through sales and tax benefits, and the creation of short-term

jobs. The character of the region would not be significantly affected.

### **Alternative 2: A Continuation of Existing Conditions**

Costs associated with hiring 27.3 additional employees could provide an additional \$24 million in total sales benefits to the local and regional economy. However, there are no provisions for additional housing under this alternative, and many employees will need to seek housing in surrounding communities. Employees locating in the communities of Why and Ajo will most likely find little opportunities to rent during the busy winter season, or to purchase year-round housing. Nevertheless, additional employees residing in these areas would have positive impacts on the local economy.

Employees commuting to the monument from outlying areas should not have a significant impact on existing traffic volumes on State Route 85.

**Conclusion.** Any economic impacts resulting from this alternative would largely effect communities surrounding the monument through increased housing demands. Other proposed actions should have a negligible impact on the local and regional economy.

### **CUMULATIVE IMPACTS**

Assessing the cumulative impact of the actions in this alternative combined with other past, present, and future actions, is required by NEPA. Unavoidable adverse impacts, irreversible commitment of resources, and short-term uses versus long-term productivity are also discussed.

### **Alternative 1: The Preferred Future**

The cumulative effect of the proposed actions would be to enhance protection, understanding, and recognition of the Sonoran Desert. The monument's long-term monitoring program reinforces its role as a primary natural resource monitoring site in the region, providing a baseline against which environmental change can be assessed. Through the park's active participation in ISDA and development of a

## *Environmental Consequences*

MAB action plan, more exchange of information and cooperation would occur among nations in dealing with resource issues of common concern. By promoting environmental and cultural awareness in the region, the sense of regional identity associated with its historic and cultural significance would be enhanced. Results from these efforts as well as other actions in the plan could positively contribute to define and unify surrounding communities as a unique ecological, tri-cultural region.

The cumulative effect of the proposal on wilderness would be to maximize protection of wilderness resources and values and potentially increase the amount of land that qualifies as designated wilderness. Actions contained in the proposal could eventually lead to an expansion of the National Wilderness Preservation System by 2,130 acres.

As mentioned earlier, the region is faced with an array of resources threats, most of which stem from the ongoing urbanization of the Phoenix and Tucson metropolitan areas, and urban and agricultural development in northern Sonora, Mexico. The trend towards increasing population levels and urban sprawl in these areas will continue to place greater demands on regional resources resulting in soil, vegetation, and habitat loss, groundwater consumption, and air quality degradation. Actions proposed under this alternative would add to these impacts to a relatively minor extent and would have a combined cumulative impact on the environment.

The cumulative effect of in-park sources of pollution on regional air quality would be insignificant since these sources are of a temporary and localized nature. Although redesignation of the monument from a class II to a class I airshed would provide maximum protection of the monument's air quality-related values from pollution sources originating in the U.S., this action alone would be insufficient in preventing further regional air quality degradation or visibility impairment caused by foreign sources.

Proposed actions would involve no net loss to the nation's remaining wetland acreage. There would also be no additional development in regional floodplains. Although groundwater

consumption would experience a slight increase, the monument's overall water use would be insignificant when compared with the amount of groundwater consumed by urban, industrial, and agricultural activities in northern Sonora, Mexico.

Disturbance or removal of soil and desert scrub vegetation from 58 acres would be insignificant when compared both to the overall size of the monument, and the loss of desert vegetation within the region, due largely to urban sprawl in the Phoenix and Tucson metropolitan areas, as well as urban and agricultural development in northern Sonora, Mexico. The cumulative effect of such a loss would be minor since most vegetation removal would occur on previously impacted sites or near developed areas, and would be offset by revegetation of 229 acres, for a net gain of 171 acres of desert flora.

On a regional level, actions contained in the proposal would result in a negligible loss of additional wildlife habitat since all development is planned for locations where human intrusions presently exist, areas that are already of marginal value as wildlife habitat. Despite the monument's protection of an array of habitat types that support an abundant and diverse fauna, including many threatened, endangered, and sensitive species, excessive highway mortality along State Route 85 would continue to decimate all forms of wildlife along this 27-mile road corridor. Because many species are at their range limit within Organ Pipe Cactus NM, highway mortality could possibly eliminate some species from this portion of their range as well as potentially reduce their genetic variability and reproductive fitness.

Enhanced habitat protection for the endemic Quitobaquito desert pupfish and Quitobaquito snail would help perpetuate these rare species. Although positive strides in combatting the monument's poaching problem would be expected, such gains in protecting the region's flora and fauna, particularly its rare cacti and reptiles, may be negated if it merely results in a shift of the problem to less protected areas.

Increased preservation, research, and interpretation of significant cultural resources would help perpetuate the importance of understanding the significance and relationship of human use in the Sonoran Desert and the

need to preserve its cultural heritage. These efforts would also further strengthen relations with the Tohono O'odham Nation and Mexico.

The proposed actions in this alternative would result in increased revenues to the local and regional economy through sales and tax benefits from an increase in visitors, federal expenditures from facilities expansion, and housing and service demands from additional employees. Operation of the proposed facilities would continue to provide modest beneficial impacts on the local and regional economy through increased tax and job revenues from government expenditures. Any additional employee housing demands placed on surrounding communities such as Ajo, Why, and Lukeville would provide positive impacts to the local economy through increased sales and tax revenues.

An increase in monument visitors could place additional demands for services and a small to moderate increase in traffic in the communities of Lukeville, Ajo, and Why, and possibly the Tohono O'odham Reservation which could put pressure on these communities to expand to meet these demands. In comparison to other past, present, and anticipated regional actions—such as increased tourism and development of visitor facilities on Tohono O'odham land, excessive groundwater pumping in the Sonoyta valley in Mexico, extensive regional habitat loss, NAFTA-related traffic congestion, poaching, and air quality degradation—the proposed NPS-related actions evaluated in this alternative are expected to contribute a small amount to the combined cumulative impact on the region.

***Unavoidable Adverse Impacts / Irreversible Irrecoverable Commitments of Resources / Short-Term Uses versus Long-Term Productivity.*** The proposed action would result in disturbance or loss of a maximum of 58 acres of native desert flora. The irretrievable commitment of this acreage for construction purposes would preclude its use as habitat for some wildlife species. Until a reduction in the speed limit and traffic volume along State Route 85 is achieved, existing traffic patterns would continue to decimate all forms of wildlife along the road corridor, including some federally protected species.

Short-term impacts associated with construction, particularly noise, viewshed impairment, and disruption of visitor services, may displace some visitors and wildlife from the immediate area. However, such impacts are expected to be temporary since people and animals could be expected to return to these sites once construction and restoration activities are completed. To help compensate for lost or disturbed acreage, 229 acres would be revegetated, resulting in a net gain of 171 acres of native desert flora. Additional long-term benefits to monument resources would include enhanced air and viewshed protection, and an increase in the amount of acreage that qualifies as wilderness. Long-term benefits to visitors would include additional, less congested opportunities to experience the resources.

**Conclusion.** The cumulative effect of all actions contained in the proposal would be to enhance protection, understanding, and recognition of the Sonoran Desert and further strengthen relations with the Tohono O'odham Nation and Mexico. On a regional level, these actions would have an insignificant effect on air quality, groundwater consumption, and loss of soil and vegetation, and would result in no additional floodplain development. Despite a negligible loss of wildlife habitat, excessive highway mortality along State Route 85 would continue to decimate all forms of wildlife along this road corridor, possibly eliminating some species from this portion of their range as well as potentially reducing their genetic variability and reproductive fitness. Any gains made in combatting poaching of the monument's rare flora and fauna may be negated if it merely results in a shift of the problem to less protected areas in the region. The importance of understanding the need to preserve the cultural heritage of the Sonoran Desert would be perpetuated through increased preservation, research and interpretation. Revenues to the local and regional economy would continue to increase as visitation and government hiring and expenditures increase.

On a broader scale, the proposed actions would involve no net loss to the nation's remaining wetland acreage, and could eventually lead to an expansion of the

## *Environmental Consequences*

National Wilderness Preservation System by 2,130 acres. Enhanced habitat protection for the endemic Quitobaquito snail and Quitobaquito desert pupfish would help perpetuate the continued existence of this rare species and subspecies, respectively. The proposed NPS-related actions in this alternative are expected to contribute a small amount to the combined cumulative impact on the region in comparison to other past, present, and anticipated regional actions.

### **Alternative 2: Continuation of Existing Conditions**

The cumulative effects of all actions contained in this alternative would be virtually the same as those described for alternative 1, with the following exceptions. Under this alternative, since the area would remain a national monument, there would be less recognition of its importance in protecting Sonoran Desert, including habitat for many rare and sensitive species found nowhere else in the U.S. Persistent degradation of the only known habitat of the Quitobaquito desert pupfish and Quitobaquito snail could also potentially jeopardize the continued existence of these aquatic animals. Due to the park's immediate need for more housing and office space, the park would probably need to add more facilities in the future, which would add to the five acres of vegetation and soil disturbance resulting from this alternative. Preservation, knowledge, and interpretation of cultural resources would still be improved, but not as much as in Alternative 1. Economic effects would not be as great on the local and regional economy because there would be less of an increase in visitation and government expenditures. However, housing demands associated with an additional employees could result in a modest increase in sales and tax benefits to the communities of Ajo, Why, and Lukeville.

***Unavoidable Adverse Impacts / Irreversible and Irretrievable Commitments of Resources / Short-Term Uses versus Long-Term Productivity.*** Adverse impacts would be similar to those described for the proposed action, except that continued vegetation

trampling at Quitobaquito Pond could have a potentially adverse effect on the wetland's function and value as wildlife habitat for several sensitive species. Short-term uses and long-term benefits also would be essentially the same as those outlined for the proposal, although fewer acres would be disturbed by construction activities and the need for more workspace and visitor facilities would continue to increase.

**Conclusion.** As with alternative 1, the cumulative effect of all actions described in this alternative would be to enhance protection, understanding, and recognition of the most pristine area of the Sonoran Desert, but to a lesser degree. On a regional level, these actions would have an insignificant effect on air quality, groundwater consumption, and loss of soil and vegetation, and would result in no additional floodplain development. There would be no anticipated reduction in the amount of rare flora and fauna lost to poachers. Although there would be a negligible loss of wildlife habitat, excessive highway mortality along State Route 85 would continue to decimate all forms of wildlife along the road corridor, possibly eliminating some species from this portion of their range as well as potentially reducing their genetic variability and reproductive fitness. On a broader scale, the proposed actions would involve no net loss to the nation's remaining wetland acreage. No expansion of the National Wilderness Preservation System by 1,754 acres would occur, and persistent degradation of the only known habitat of the Quitobaquito desert pupfish and Quitobaquito snail could potentially jeopardize the continued existence of these aquatic animals. As with Alternative 1, the actions proposed in this alternative, when combined with related past, current, and anticipated regional actions, are expected to contribute a small amount to the combined cumulative impact on the region.

## CONSULTATION and COORDINATION

### SCOPING PROCESS

In April of 1988, the NPS announced its intention to prepare a general management plan and development concept plans for Organ Pipe Cactus NM. A notice of intent was published in the Federal Register on May 18th, 1989, indicating that the NPS would do scoping as part of the planning process.

Meetings, public workshops, and surveys were an integral part of the scoping process. Their purpose was to identify issues, alternatives, and impact topics that would be considered in planning and to keep the public informed throughout plan formulation.

A strategic planning workshop was held on August 18, 1988. Participants from the United States, Tohono O'odham, and Mexico, and a wide range of disciplines attended this workshop to discuss issues affecting the monument and possible solutions. A series of formal and informal scoping meetings to gather information to discuss issues and alternatives have occurred since this time. The NPS suspended the planning project in fiscal year 1989 due to funding constraints.

Planning resumed in 1990 and, on June 11-15, 1990, an Interpretive Workshop was held at the monument. The workshop resulted in development of park purpose and significance statements, desired futures for the monument, draft alternatives, and an Interpretive Prospectus. On September 16-24, 1991, team members met with park neighbors and surrounding agency managers to present alternative ideas for discussion. Presentations were given in Phoenix, Tucson, the Tohono O'odham Indian Reservation, and the NPS Mexican Affairs Office, and the NMSU Border Research Institute in Las Cruces, New Mexico.

Another notice of intent was published in the Federal Register on December 17th, 1991 to announce the NPS's intent to prepare an Environmental Impact Statement for the general management plan. The planning process was curtailed again due to lack of funds in fiscal year 1993.

Planning resumed again in March of 1994. The draft alternatives have been updated and refined in response to several programs and developments occurring both within and outside the monument's boundaries. One such development involved the establishment of ISDA. The goals of ISDA include promoting environmentally sustainable and culturally sound economic development while protecting the natural resources and tri-cultural heritage of the western Sonoran Desert. On May 23, 1994, a presentation was made and discussions were held with ISDA regarding the status and current direction of the planning effort.

Additional public involvement meetings are planned when the draft document is made available to the public to gather more input on the alternatives and potential affects of this plan. At a minimum, meetings will be held in Ajo, the Tohono O'odham Indian Reservation, and Mexico. Information on the meetings will be announced in the United States, Mexico, and on the Tohono O'odham Reservation in the English, Spanish, and Tohono O'odham languages. In an attempt to reach the Tohono O'odham and Mexican peoples who could be affected by this plan, the planning team intends to work with local radio stations to record and broadcast the document summary in the Tohono O'odham and Spanish languages.

In accordance with NEPA, the US Fish and Wildlife Service and the Arizona Game and Fish Department were consulted throughout the process. Recent letters documenting this coordination can be found in Appendix G.

### NATIVE AMERICAN CONSULTATIONS

Consultations with Native Americans, including American Indian tribes that could be affected by this plan are required by the National Historic Preservation Act of 1966, as amended. For the Organ Pipe Cactus General Management Plan, American Indian consultations began with the initial scoping meeting held at the park on August 18, 1988. Neighboring agencies and groups attended, including representatives from the Tohono

## *Environmental Consequences*

O'odham (formerly known as Papago) and Hia-Ced O'odham (formerly known as Sand Papago). Further contact and communication occurred on January 24, 1989, March 11, 1989, January 19, 1990, September 10, 1990, September 23, 1991, July 14, 1992, February 8, 1994, February 15, 1994, April 13, 1994, and April 19, 1994. For some of these dates, meetings were held with officers and members of the neighboring Gu Vo and Hicikwan Districts of the Tohono O'odham Nation as well as officers and staffers of the Tohono O'odham national tribal government in Sells, Arizona. During the rest of these dates, ethnographic interviews were held or site visits made to the park and to selected communities of the Tohono O'odham Nation. NPS planning staff met with various O'odham individuals knowledgeable about traditional land uses and other cultural practices pertinent to the management of cultural and natural resources in the monument.

American Indian concerns focused upon four topical areas: (1) the need for local hiring of qualified O'odham persons, including hiring by the park; (2) the mutual need to share information about cultural and natural resources; (3) the need for access to the park for traditional purposes, including plant gathering, meditation, and religious worship, without an entry fee; (4) the desire for the NPS to consult with the relevant Hia-Ced O'odham and Tohono O'odham groups about finds of archeological sites or human remains, about management plans, and about future interpretive exhibits. These concerns are either addressed in this general management plan or in on-going park programs. Additional consultations will be held during the public comment period when the draft general management plan is on review.

Additionally, American Indian consultation continues to take place through ISDA, whose first conference was held in Ajo, Arizona, October 22-24, 1992, and of which the NPS and the Hia-Ced O'odham and Tohono O'odham are active members.

## **CONSULTATIONS WITH THE ARIZONA STATE HISTORIC PRESERVATION OFFICER**

As an outgrowth of the general management plan, the Arizona State Historic Preservation Officer (ASHPO) was closely consulted about the nomination forms for listing in the National Register of Historic Places concerning Bates Well Ranch, Dos Lomitas Ranch, I'itoi Mo'o (Montezuma's Head), and Quitobaquito Springs. The first three properties were listed in the National Register on May 20, 1994, May 6, 1994, and May 2, 1994, respectively. The ASHPO declared Quitobaquito Springs to be eligible for National Register listing on August 18, 1994; a revised nomination form is pending before the ASHPO. The ASHPO received the draft general management plan for review on December 5, 1994, and concurred with the proposed action on January 4, 1995. During the planning process, four different representatives of the ASHPO made three separate trips to the park for on-site cultural resource visits with members of the planning team.

## **LIST OF REVIEWERS**

Copies of the draft document will be sent to the following agencies and organizations for review.

### **Arizona Congressional Delegation**

Senator John McCain  
Senator Jon Kyl  
Congressman Ed Pastor

### **Federal Agencies**

Advisory Council on Historic Preservation  
Department of Agriculture  
    Natural Resources Conservation Service  
    (formerly the Soil Conservation Service)  
Department of Defense  
    Barry M. Goldwater Airforce Range  
    Luke Air Force Base  
Department of the Interior  
    Bureau of Indian Affairs  
    Bureau of Land Management  
    Fish and Wildlife Service, Region 2,  
    Phoenix Field Office

**National Park Service:**

Mexico Affairs Office  
Saguaro National Park  
Southern Arizona Group  
Western Archeological and  
Conservation Center  
Department of Customs and Immigration  
Department of Justice  
Immigration and Naturalization Service  
Border Patrol  
Environmental Protection Agency

**Tribal Governments**

Tohono O'odham Nation  
Baboquivari District  
Chukut Kuk District  
Gu Achi District  
Gu Vo District  
Hickiwan District  
San Lucy District  
San Xavier District  
Schuk Toak District  
Sells District  
Sif Oidak District  
Pisinemo District

**State Agencies**

Arizona Department of Environmental Quality  
Arizona Game and Fish Department  
Arizona Department of Natural Resources  
Arizona Department of Tourism  
Arizona Department of Transportation  
Arizona Governor's Office  
Arizona Highway Patrol  
Arizona Public Service  
Arizona State Historic Preservation Officer  
Sonora, Mexico

**Local Agencies**

City of Ajo  
City of Gila Bend  
City of Yuma  
Community of Lukeville  
Community of Why  
Municipality of Sonoyta  
Municipality of Puerto Penasco  
Pima County Government

**Organizations**

Arizona Sonoran Desert Museum  
Center for the Study of Deserts and Oceans  
Centro de Ecologico de Sonora  
International Sonoran Desert Alliance  
El Pinacate Y el Gran Desierto (The Pinacate  
and Great Desert) Biosphere Reserve  
Alto Gulfo de California Y Delta del Rio  
Colorado (Gulf of California and the  
Upper Delta of the Colorado River)  
Biosphere Reserve  
Friends of Pronotura  
National Parks and Conservation Association  
Sonoran Institute  
Wilderness Society

## PLANNING TEAM and CONTRIBUTORS

### PLANNING TEAM MEMBERS

Harold Smith, Superintendent, Organ Pipe Cactus National Monument

Patricia Trap, Team Captain (February 1994 to plan present), Landscape Architect, Denver Service Center

Larry L. Norris, Team Captain, (March 1990 to February 1994), Natural Resource Specialist, Denver Service Center

Michael Strunk, Team Captain (plan start to March 1990), Landscape Architect, Denver Service Center

James Barnett, Chief of Resource Management, Organ Pipe Cactus National Monument

Anecito Olais, Chief Park Ranger (August 1990 to plan present)

Ed Lopez, Chief Park Ranger (plan start to January 1990), Organ Pipe Cactus National Monument

Bill Mikus, Facility Manager, Organ Pipe Cactus National Monument

Ray Murray, Chief of Planning, Grants, and Environmental Compliance Western Regional Office

Caroline Wilson, Interpretive Specialist, Organ Pipe Cactus National Monument (plan start to January 1994)

Marilyn Hof, Interpretive Planner, Denver Service Center

Dr. Lawrence Van Horn, Cultural Anthropologist, Denver Service Center

Sally Snyder, Planning Technician, Denver Service Center

Dr. Catherine H. Spude, Archeologist, Denver Service Center

Frank Williss, Historian, Denver Service Center

Liz Bellantoni, Natural Resource Specialist, Denver Service Center

Laurie Domler, Community Planner, Denver Service Center

### CONTRIBUTORS

Sarah Bransom, Section Chief for Resource Planning, Denver Service Center

Gary Hurelle, Landscape Architect, Denver Service Center

Bryan Hooks, Landscape Architect, Denver Service Center

Gary W. Johnson, Section Chief for Site Planning and, Denver Service Center

Will Martinez, Maintenance Foreman, Organ Pipe Cactus National Monument

Carlos Nagel, Cultural Exchange Specialist, Friends of Pronaturra

Adrienne Rankin, Archeologist, Western Archeological Center

Gary Smillie, Hydrologist, Water Resources Division, Washington Office

Michael Spratt, Section Chief for General Planning and Special Resource Studies, Denver Service Center

### Publication Services

Mike Hart, Visual Information Specialist, Denver Service Center

Mary Kennedy Bulick, Editor, Boulder, Colorado

Inge Fox-Jones, Graphic Artist, Inge Fox-Jones Design, Denver, Colorado

APPENDIXES AND  
BIBLIOGRAPHY



# APPENDIX A: LEGISLATION

Presidential Proclamation No. 2232 of April 13, 1937.

## 59. Organ Pipe Cactus National Monument

Establishment: Proclamation (No. 2232) of April 13, 1937..... Page  
262

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

### A PROCLAMATION

[No. 2232—Apr. 13, 1937—50 Stat. 1827]

WHEREAS certain public lands in the State of Arizona contain historic landmarks, and have situated thereon various objects of historic and scientific interest; and

WHEREAS it appears that it would be in the public interest to reserve such lands as a national monument, to be known as the Organ Pipe Cactus National Monument:

NOW, THEREFORE, I, Franklin D. Roosevelt, President of the United States of America, under and by virtue of the authority vested in me by section 2 of the Act of June 8, 1906 (ch. 3060, 34 Stat. 225; U. S. C. title 16, sec. 431), do proclaim that, subject to existing rights, the following-described lands in Arizona are hereby reserved from all forms of appropriation under the public-land laws and set apart as the Organ Pipe Cactus National Monument:

#### GILA AND SALT RIVER MERIDIAN

Beginning at a point on the southern boundary of the Papago Indian Reservation which is the point for the corner of secs. 5, 6, 31, and 32, Tps. 17 and 18 S., R. 3 W.; thence south approximately five and one-half miles to the International Boundary; thence northwesterly along the International Boundary to the intersection with the position for the third meridional section line through unsurveyed T. 17 S., R. 8 W.; thence north on the third meridional section line through Tps. 17, 16, 15 and 14 S., R. 8 W. (unsurveyed), to the point for the corner of secs. 15, 16, 21 and 22; thence east on the third latitudinal section line through T. 14 S., Rs. 8, 7, 6 and 5 W., to the corner of sections 13, 18, 19 and 24, T. 14 S., Rs. 4 and 5 W., on the west boundary of the Papago Indian Reservation; thence southerly and easterly along the west boundary of the Papago Indian Reservation to the point for the corner of secs. 5, 6, 31, and 32, Tps. 17 and 18 S., R. 3 W., which is the point of beginning, containing approximately 330,690 acres.

Warning is hereby expressly given to all unauthorized persons not to appropriate, injure, destroy, or remove any feature of this monument and not to locate or settle upon any of the lands thereof.

The Director of the National Park Service, under the direction of the Secretary of the Interior, shall have the supervision, management, and control of the monument as provided in the act of Congress entitled "An Act To establish a National Park Service, and for other purposes," approved August 25, 1916 (ch. 408, 39 Stat. 535; U. S. C., title 16, secs. 1 and 2), and acts supplementary thereto or amendatory thereof; *Provided*, That the administration of the monument shall be subject to: (1) Right of the Indians of the Papago Reservation to pick the fruits of the organ pipe cactus and other cacti, under such regulations as may be prescribed by the Secretary of the Interior; (2) Proclamation of May 27, 1907 (35 Stat.

VIII. NATIONAL MONUMENTS—ORGAN PIPE CACTUS 263

2136)<sup>1</sup>; (3) Executive Order No. 5462 of October 14, 1930<sup>2</sup>; and (4) Executive Order of November 21, 1923,<sup>3</sup> reserving a 40-acre tract as a public water reserve.

The reservation made by this proclamation supersedes as to any of the above-described lands affected thereby the temporary withdrawal for classification and other purposes made by Executive Order No. 6910 of November 26, 1934, as amended.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the seal of the United States to be affixed.

DONE at the city of Washington this 13 day of April in the year of our Lord nineteen hundred and thirty-seven and of the Independence of the United States of America the one hundred and sixty-first.

FRANKLIN D. ROOSEVELT.

By the President:  
CORDELL HULL,  
*The Secretary of State.*

<sup>1</sup> Reserved a strip of land 60 feet wide along the international boundary between the United States and Mexico which may be used for highways but for no other purpose.

<sup>2</sup> Executive Order 5462 was partially revoked by Executive Order 6500 of December 15, 1933. The effect of this partial revocation was to leave a certain tract of land remaining withdrawn for customs and immigration-inspection purposes, consisting of lot 9, sec. 6, and lot 4, sec. 7, T. 18 S., R. 5 W. of the Gila and Salt River meridian, containing a total of 5.84 acres.

<sup>3</sup> Public water reserve No. 88 withdrew the following lands in Arizona for public use in accordance with the provisions of sec. 10 of the act of December 29, 1916 (39 Stat. 862): T. 17 S., R. 7 W., all lands within one-fourth mile of an unnamed pond located in what will probably be, when surveyed, the SW $\frac{1}{4}$  of NE $\frac{1}{4}$ , sec. 17, Gila Salt River meridian.

Presidential Proclamation of May 27, 1907.

May 27, 1907.

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA.

A PROCLAMATION.

Mexican bound-  
ary. Preamble.

WHEREAS, it is necessary for the public welfare that a strip of land lying along the boundary line between the United States and the Republic of Mexico be reserved from the operation of the public land laws and kept free from obstruction as a protection against the smuggling of goods between the United States and said Republic;

Reservation of a  
strip of land 60  
feet wide.

Now, therefore, I, THEODORE ROOSEVELT, President of the United States, do hereby declare, proclaim and make known that there are hereby reserved from entry, settlement or other form of appropriation under the public land laws and set apart as a public reservation, all public lands within sixty feet of the international boundary between the United States and the Republic of Mexico, within the State of California and the Territories of Arizona and New Mexico; and where any river or stream forms any part of said international boundary line, this reservation shall be construed and taken as extending to and including all public lands belonging to the United States which lie within sixty feet of the margin of such river or stream.

Location.

Lands excepted.

Excepting from the force and effect of this proclamation all lands which are at this date embraced in any legal entry or covered by any lawful filing, selection or rights of way duly of record in the proper United States Land Office, or upon which any valid settlement has been made pursuant to law, and the statutory period within which to make entry or filing of record has not expired; and also excepting all lands which at this date are embraced within any withdrawal or reservation for any use or purpose to which this reservation for customs purposes is repugnant; PROVIDED, that these exceptions shall not continue to apply to any particular tract of land unless the entryman, settler or claimant continues to comply with the law under which the entry, filing or settlement was made, or unless the reservation or withdrawal to which this reservation is inconsistent continues in force; PROVIDED FURTHER, that the said strips, tracts, or parcels of land, reserved as aforesaid, may be used for public highways but for no other purpose whatever, so long as the reservation of same under this proclamation shall continue in force.

Use for public  
highways.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the seal of the United States to be affixed.

DONE at the City of Washington this 27th day of May, in the year of our Lord one thousand nine hundred and seven, and of [SEAL.] the Independence of the United States the one hundred and thirty-first.

THEODORE ROOSEVELT

By the President:  
ELIHU ROOT  
*Secretary of State.*

Executive Order No. 5462 of 1930.

# Executive Order

## Withdrawal of Public Land for Customs and Immigration Inspection Purposes

### Arizona

It is hereby ordered that the following described tract of land in Arizona, in what will probably be, when surveyed, secs. 6 and 7, T. 18 S., R. 5 W., Gila and Salt River meridian, be, and the same is hereby, temporarily withdrawn from settlement, location, sale, or entry, subject to valid existing rights, for customs and immigration inspection purposes at the international boundary line in Arizona:

Beginning at the intersection of the center line of the Ajo-Sonoyta highway with the United States-Mexico international boundary, in approximate latitude  $31^{\circ} 53'$  N., and longitude  $112^{\circ} 49'$  W., 352.6 feet S.  $70^{\circ} 20'$  E. of international boundary monument No. 167. Thence along said international boundary, N.  $70^{\circ} 20'$  W., 3.30 chains. Thence parallel to the center line of the Ajo-Sonoyta highway (which bears approximately N.  $35^{\circ} 14'$  E.), 10.00 chains. Thence parallel to said international boundary, S.  $70^{\circ} 20'$  E., 10.00 chains. Thence parallel to the Ajo-Sonoyta highway (S.  $35^{\circ} 14'$  W.), 10.00 chains, to a point on said international boundary. Thence along said international boundary, N.  $70^{\circ} 20'$  W., 0.70 chains, to the center line of the Ajo-Sonoyta highway, and the place of beginning, containing approximately 10 acres; excepting and excluding from this withdrawal, however, the 60-foot strip of land along the international boundary line reserved for customs purposes by Proclamation No. 758 of May 27, 1907 (35 Stat. 2130).

This order shall continue in full force and effect unless and until revoked by the President or by act of Congress.

HERBERT HOOVER

THE WHITE HOUSE,

October 14, 1930.

Executive Order of November 21, 1923.

**ORDER OF WITHDRAWAL**  
**PUBLIC WATER RESERVE NO. 58**

Under and pursuant to the provisions of the act of Congress approved June 25, 1910 (36 Stat., 847), entitled "An act to authorize the President of the United States to make withdrawals of public lands in certain cases", as amended by act of Congress approved August 24, 1912 (37 Stat., 497), it is hereby ordered that the lands hereinafter listed be, and the same are hereby, withdrawn from settlement, location, sale, or entry, and reserved for public use in accordance with the provisions of Sec. 10 of the act of December 29, 1916 (39 Stat., 862):

ARIZONA

Gila and Salt River Meridian

119-

T. 17 S., R. 7 W., All lands within one-fourth mile of an unnamed pond located in what will probably be when surveyed the SW $\frac{1}{4}$  of NE $\frac{1}{4}$ , Sec. 17.

  
President.

November 21 1923.

Wilderness Act.



Public Law 88-577  
88th Congress, S. 4  
September 3, 1964

An Act

To establish a National Wilderness Preservation System for the permanent good of the whole people, and for other purposes.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,*

Wilderness Act.

SHORT TITLE

SECTION 1. This Act may be cited as the "Wilderness Act".

WILDERNESS SYSTEM ESTABLISHED STATEMENT OF POLICY

SEC. 2. (a) In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness. For this purpose there is hereby established a National Wilderness Preservation System to be composed of federally owned areas designated by Congress as "wilderness areas", and these shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness; and no Federal lands shall be designated as "wilderness areas" except as provided for in this Act or by a subsequent Act.

(b) The inclusion of an area in the National Wilderness Preservation System notwithstanding, the area shall continue to be managed by the Department and agency having jurisdiction thereover immediately before its inclusion in the National Wilderness Preservation System unless otherwise provided by Act of Congress. No appropriation shall be available for the payment of expenses or salaries for the administration of the National Wilderness Preservation System as a separate unit nor shall any appropriations be available for additional personnel stated as being required solely for the purpose of managing or administering areas solely because they are included within the National Wilderness Preservation System.

78 STAT. 890.  
78 STAT. 891.

DEFINITION OF WILDERNESS

(c) 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 untrammelled 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, geo-

Pub. Law 88-577 - 2 - September 3, 1964

logical, or other features of scientific, educational, scenic, or historical value.

NATIONAL WILDERNESS PRESERVATION SYSTEM—EXTENT OF SYSTEM

SEC. 3. (a) All areas within the national forests classified at least 30 days before the effective date of this Act by the Secretary of Agriculture or the Chief of the Forest Service as "wilderness", "wild", or "canoe" are hereby designated as wilderness areas. The Secretary of Agriculture shall—

(1) Within one year after the effective date of this Act, file a map and legal description of each wilderness area with the Interior and Insular Affairs Committees of the United States Senate and the House of Representatives, and such descriptions shall have the same force and effect as if included in this Act: *Provided, however,* That correction of clerical and typographical errors in such legal descriptions and maps may be made.

(2) Maintain, available to the public, records pertaining to said wilderness areas, including maps and legal descriptions, copies of regulations governing them, copies of public notices of, and reports submitted to Congress regarding pending additions, eliminations, or modifications. Maps, legal descriptions, and regulations pertaining to wilderness areas within their respective jurisdictions also shall be available to the public in the offices of regional foresters, national forest supervisors, and forest rangers.

Classification.

Presidential recommendation to Congress.

Congressional approval.

78 STAT. 891.  
78 STAT. 892.

(b) The Secretary of Agriculture shall, within ten years after the enactment of this Act, review, as to its suitability or nonsuitability for preservation as wilderness, each area in the national forests classified on the effective date of this Act by the Secretary of Agriculture or the Chief of the Forest Service as "primitive" and report his findings to the President. The President shall advise the United States Senate and House of Representatives of his recommendations with respect to the designation as "wilderness" or other reclassification of each area on which review has been completed, together with maps and a definition of boundaries. Such advice shall be given with respect to not less than one-third of all the areas now classified as "primitive" within three years after the enactment of this Act, not less than two-thirds within seven years after the enactment of this Act, and the remaining areas within ten years after the enactment of this Act. Each recommendation of the President for designation as "wilderness" shall become effective only if so provided by an Act of Congress. Areas classified as "primitive" on the effective date of this Act shall continue to be administered under the rules and regulations affecting such areas on the effective date of this Act until Congress has determined otherwise. Any such area may be increased in size by the President at the time he submits his recommendations to the Congress by not more than five thousand acres with no more than one thousand two hundred and eighty acres of such increase in any one compact unit; if it is proposed to increase the size of any such area by more than five thousand acres or by more than one thousand two hundred and eighty acres in any one compact unit the increase in size shall not become effective until acted upon by Congress. Nothing herein contained shall limit the President in proposing, as part of his recommendations to Congress, the alteration of existing boundaries of primitive areas or recommending the addition of any contiguous area of national forest lands predominantly of wilderness value. Notwithstanding any other provisions of this Act, the Secretary of Agriculture may complete his review and delete such area as may be necessary, but not to exceed seven thousand acres, from the southern tip of the Gore Range-Eagles Nest Primitive Area,

September 3, 1964 - 3 - Pub. Law 88-577

Colorado, if the Secretary determines that such action is in the public interest.

(c) Within ten years after the effective date of this Act the Secretary of the Interior shall review every roadless area of five thousand contiguous acres or more in the national parks, monuments and other units of the national park system and every such area of, and every roadless island within, the national wildlife refuges and game ranges, under his jurisdiction on the effective date of this Act and shall report to the President his recommendation as to the suitability or unsuitability of each such area or island for preservation as wilderness. The President shall advise the President of the Senate and the Speaker of the House of Representatives of his recommendation with respect to the designation as wilderness of each such area or island on which review has been completed, together with a map thereof and a definition of its boundaries. Such advice shall be given with respect to not less than one-third of the areas and islands to be reviewed under this subsection within three years after enactment of this Act, not less than two-thirds within seven years of enactment of this Act, and the remainder within ten years of enactment of this Act. A recommendation of the President for designation as wilderness shall become effective only if so provided by an Act of Congress. Nothing contained herein shall, by implication or otherwise, be construed to lessen the present statutory authority of the Secretary of the Interior with respect to the maintenance of roadless areas within units of the national park system.

Report to President.

Presidential recommendation to Congress.

Congressional approval.

(d) (1) The Secretary of Agriculture and the Secretary of the Interior shall, prior to submitting any recommendations to the President with respect to the suitability of any area for preservation as wilderness—

Suitability.

(A) give such public notice of the proposed action as they deem appropriate, including publication in the Federal Register and in a newspaper having general circulation in the area or areas in the vicinity of the affected land;

Publication in Federal Register.

(B) hold a public hearing or hearings at a location or locations convenient to the area affected. The hearings shall be announced through such means as the respective Secretaries involved deem appropriate, including notices in the Federal Register and in newspapers of general circulation in the area: *Provided*, That if the lands involved are located in more than one State, at least one hearing shall be held in each State in which a portion of the land lies;

Hearings.

Publication in Federal Register.

78 STAT. 892.  
78 STAT. 893.

(C) at least thirty days before the date of a hearing advise the Governor of each State and the governing board of each county, or in Alaska the borough, in which the lands are located, and Federal departments and agencies concerned, and invite such officials and Federal agencies to submit their views on the proposed action at the hearing or by no later than thirty days following the date of the hearing.

(2) Any views submitted to the appropriate Secretary under the provisions of (1) of this subsection with respect to any area shall be included with any recommendations to the President and to Congress with respect to such area.

(e) Any modification or adjustment of boundaries of any wilderness area shall be recommended by the appropriate Secretary after public notice of such proposal and public hearing or hearings as provided in subsection (d) of this section. The proposed modification or adjustment shall then be recommended with map and description thereof to the President. The President shall advise the United States Senate and the House of Representatives of his recommendations with respect to such modification or adjustment and such recom-

Proposed modification.

Pub. Law 88-577 - 4 - September 3, 1964

mendations shall become effective only in the same manner as provided for in subsections (b) and (c) of this section.

USE OF WILDERNESS AREAS

SEC. 4. (a) The purposes of this Act are hereby declared to be within and supplemental to the purposes for which national forests and units of the national park and national wildlife refuge systems are established and administered and—

(1) Nothing in this Act shall be deemed to be in interference with the purpose for which national forests are established as set forth in the Act of June 4, 1897 (30 Stat. 11), and the Multiple-Use Sustained-Yield Act of June 12, 1960 (74 Stat. 215).

16 USC 475.  
16 USC 528-531.

(2) Nothing in this Act shall modify the restrictions and provisions of the Shipstead-Nolan Act (Public Law 539, Seventy-first Congress, July 10, 1930; 46 Stat. 1020), the Thye-Blatnik Act (Public Law 733, Eightieth Congress, June 22, 1948; 62 Stat. 568), and the Humphrey-Thye-Blatnik-Andresen Act (Public Law 607, Eighty-fourth Congress, June 22, 1956; 70 Stat. 326), as applying to the Superior National Forest or the regulations of the Secretary of Agriculture.

16 USC 577-577b.  
16 USC 577c-577h.  
16 USC 577d-1,  
577g-1, 577h.

(3) Nothing in this Act shall modify the statutory authority under which units of the national park system are created. Further, the designation of any area of any park, monument, or other unit of the national park system as a wilderness area pursuant to this Act shall in no manner lower the standards evolved for the use and preservation of such park, monument, or other unit of the national park system in accordance with the Act of August 25, 1916, the statutory authority under which the area was created, or any other Act of Congress which might pertain to or affect such area, including, but not limited to, the Act of June 8, 1906 (34 Stat. 225; 16 U.S.C. 432 et seq.); section 3(2) of the Federal Power Act (16 U.S.C. 796(2)); and the Act of August 21, 1935 (49 Stat. 666; 16 U.S.C. 461 et seq.).

39 Stat. 535.  
16 USC 1 et seq.

41 Stat. 1063.  
49 Stat. 838.

78 STAT. 893.  
78 STAT. 894.

(b) 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.

PROHIBITION OF CERTAIN USES

(c) Except as specifically provided for in this Act, and subject to existing private rights, there shall be no commercial enterprise and no permanent road within any wilderness area designated by this Act and, except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area.

SPECIAL PROVISIONS

(d) The following special provisions are hereby made:

(1) Within wilderness areas designated by this Act the use of aircraft or motorboats, where these uses have already become established, may be permitted to continue subject to such restrictions as the Secretary of Agriculture deems desirable. In addition, such measures may be taken as may be necessary in the control of fire, insects, and diseases, subject to such conditions as the Secretary deems desirable.

(2) Nothing in this Act shall prevent within national forest wilderness areas any activity, including prospecting, for the purpose of gathering information about mineral or other resources, if such activity is carried on in a manner compatible with the preservation of the wilderness environment. Furthermore, in accordance with such program as the Secretary of the Interior shall develop and conduct in consultation with the Secretary of Agriculture, such areas shall be surveyed on a planned, recurring basis consistent with the concept of wilderness preservation by the Geological Survey and the Bureau of Mines to determine the mineral values, if any, that may be present; and the results of such surveys shall be made available to the public and submitted to the President and Congress.

(3) Notwithstanding any other provisions of this Act, until midnight December 31, 1983, the United States mining laws and all laws pertaining to mineral leasing shall, to the same extent as applicable prior to the effective date of this Act, extend to those national forest lands designated by this Act as "wilderness areas"; subject, however, to such reasonable regulations governing ingress and egress as may be prescribed by the Secretary of Agriculture consistent with the use of the land for mineral location and development and exploration, drilling, and production, and use of land for transmission lines, waterlines, telephone lines, or facilities necessary in exploring, drilling, producing, mining, and processing operations, including where essential the use of mechanized ground or air equipment and restoration as near as practicable of the surface of the land disturbed in performing prospecting, location, and, in oil and gas leasing, discovery work, exploration, drilling, and production, as soon as they have served their purpose. Mining locations lying within the boundaries of said wilderness areas shall be held and used solely for mining or processing operations and uses reasonably incident thereto; and hereafter, subject to valid existing rights, all patents issued under the mining laws of the United States affecting national forest lands designated by this Act as wilderness areas shall convey title to the mineral deposits within the claim, together with the right to cut and use so much of the mature timber therefrom as may be needed in the extraction, removal, and beneficiation of the mineral deposits, if needed timber is not otherwise reasonably available, and if the timber is cut under sound principles of forest management as defined by the national forest rules and regulations, but each such patent shall reserve to the United States all title in or to the surface of the lands and products thereof, and no use of the surface of the claim or the resources therefrom not reasonably required for carrying on mining or prospecting shall be allowed except as otherwise expressly provided in this Act: *Provided*, That, unless hereafter specifically authorized, no patent within wilderness areas designated by this Act shall issue after December 31, 1983, except for the valid claims existing on or before December 31, 1983. Mining claims located after the effective date of this Act within the boundaries of wilderness areas designated by this Act shall create no rights in excess of those rights which may be patented under the

Mineral leases,  
claims, etc.

78 STAT. 894.  
78 STAT. 895.

Pub. Law 88-577 - 6 - September 3, 1964

provisions of this subsection. Mineral leases, permits, and licenses covering lands within national forest wilderness areas designated by this Act shall contain such reasonable stipulations as may be prescribed by the Secretary of Agriculture for the protection of the wilderness character of the land consistent with the use of the land for the purposes for which they are leased, permitted, or licensed. Subject to valid rights then existing, effective January 1, 1984, the minerals in lands designated by this Act as wilderness areas are withdrawn from all forms of appropriation under the mining laws and from disposition under all laws pertaining to mineral leasing and all amendments thereto.

Water resources.

(4) Within wilderness areas in the national forests designated by this Act, (1) the President may, within a specific area and in accordance with such regulations as he may deem desirable, authorize prospecting for water resources, the establishment and maintenance of reservoirs, water-conservation works, power projects, transmission lines, and other facilities needed in the public interest, including the road construction and maintenance essential to development and use thereof, upon his determination that such use or uses in the specific area will better serve the interests of the United States and the people thereof than will its denial; and (2) the grazing of livestock, where established prior to the effective date of this Act, shall be permitted to continue subject to such reasonable regulations as are deemed necessary by the Secretary of Agriculture.

(5) Other provisions of this Act to the contrary notwithstanding, the management of the Boundary Waters Canoe Area, formerly designated as the Superior, Little Indian Sioux, and Caribou Roadless Areas, in the Superior National Forest, Minnesota, shall be in accordance with regulations established by the Secretary of Agriculture in accordance with the general purpose of maintaining, without unnecessary restrictions on other uses, including that of timber, the primitive character of the area, particularly in the vicinity of lakes, streams, and portages: *Provided*, That nothing in this Act shall preclude the continuance within the area of any already established use of motorboats.

(6) Commercial services may be performed within the wilderness areas designated by this Act to the extent necessary for activities which are proper for realizing the recreational or other wilderness purposes of the areas.

(7) Nothing in this Act shall constitute an express or implied claim or denial on the part of the Federal Government as to exemption from State water laws.

78 STAT. 895.  
78 STAT. 895.

(8) Nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish in the national forests.

#### STATE AND PRIVATE LANDS WITHIN WILDERNESS AREAS

SEC. 5. (a) In any case where State-owned or privately owned land is completely surrounded by national forest lands within areas designated by this Act as wilderness, such State or private owner shall be given such rights as may be necessary to assure adequate access to such State-owned or privately owned land by such State or private owner and their successors in interest, or the State-owned land or privately owned land shall be exchanged for federally owned land in the same State of approximately equal value under authorities available to the Secretary of Agriculture: *Provided, however*, That the United States shall not transfer to a State or private owner any mineral interests unless the State or private owner relinquishes or

Transfers, re-  
striction.

September 3, 1964

- 7 -

Pub. Law 88-577

78 STAT. 896.

causes to be relinquished to the United States the mineral interest in the surrounded land.

(b) In any case where valid mining claims or other valid occupancies are wholly within a designated national forest wilderness area, the Secretary of Agriculture shall, by reasonable regulations consistent with the preservation of the area as wilderness, permit ingress and egress to such surrounded areas by means which have been or are being customarily enjoyed with respect to other such areas similarly situated.

(c) Subject to the appropriation of funds by Congress, the Secretary of Agriculture is authorized to acquire privately owned land within the perimeter of any area designated by this Act as wilderness if (1) the owner concurs in such acquisition or (2) the acquisition is specifically authorized by Congress.

Acquisition.

GIFTS, BEQUESTS, AND CONTRIBUTIONS

SEC. 6. (a) The Secretary of Agriculture may accept gifts or bequests of land within wilderness areas designated by this Act for preservation as wilderness. The Secretary of Agriculture may also accept gifts or bequests of land adjacent to wilderness areas designated by this Act for preservation as wilderness if he has given sixty days advance notice thereof to the President of the Senate and the Speaker of the House of Representatives. Land accepted by the Secretary of Agriculture under this section shall become part of the wilderness area involved. Regulations with regard to any such land may be in accordance with such agreements, consistent with the policy of this Act, as are made at the time of such gift, or such conditions, consistent with such policy, as may be included in, and accepted with, such bequest.

(b) The Secretary of Agriculture or the Secretary of the Interior is authorized to accept private contributions and gifts to be used to further the purposes of this Act.

ANNUAL REPORTS

SEC. 7. At the opening of each session of Congress, the Secretaries of Agriculture and Interior shall jointly report to the President for transmission to Congress on the status of the wilderness system, including a list and descriptions of the areas in the system, regulations in effect, and other pertinent information, together with any recommendations they may care to make.

Approved September 3, 1964.

LEGISLATIVE HISTORY:

HOUSE REPORTS: No. 1538 accompanying H. R. 9070 (Comm. on Interior & Insular Affairs) and No. 1829 (Comm. of Conference).

SENATE REPORT No. 109 (Comm. on Interior & Insular Affairs).

CONGRESSIONAL RECORD:

Vol. 109 (1963): Apr. 4, 8, considered in Senate.

Apr. 9, considered and passed Senate.

Vol. 110 (1964): July 28, considered in House.

July 30, considered and passed House, amended, in lieu of H. R. 9070.

Aug. 20, House and Senate agreed to conference report.

## APPENDIX B: COST ESTIMATE BREAKDOWNS

### ALTERNATIVE 1

Feb. 24, 1995

Cost Item	Gross Constr. Cost	Advance Planning Cost	Total Costs
<b>TWIN PEAKS</b>			
Visitor Center	\$1,572,000	\$300,000	\$1,872,000
V.C. covered veranda	\$131,000	\$25,000	\$156,000
V.C. programs & exhibits	\$1,443,620	\$275,500	\$1,719,120
V.C. Sitework	\$314,400	\$60,000	\$374,400
V.C. car & bus parking	\$249,424	\$47,600	\$297,024
Picnic area (w/ramada)	\$37,728	\$7,200	\$44,928
Employee Housing			
Convert rec. & com. ctrs. to resid.	\$111,350	\$21,250	\$132,600
Reconvert two dormitories	\$85,150	\$16,250	\$101,400
Apts. w/covered parking (10)	\$786,000	\$150,000	\$936,000
Satellite dish	\$26,200	\$5,000	\$31,200
Utility building	\$183,400	\$35,000	\$218,400
Housing sitework	\$233,180	\$44,500	\$277,680
Community Center	\$245,625	\$46,875	\$292,500
Com. Ctr. Recreation Facil.	\$98,250	\$18,750	\$117,000
Campground tent site development	\$47,160	\$9,000	\$56,160
Campground parking	\$27,838	\$5,313	\$33,150
Campground restroom	\$170,300	\$32,500	\$202,800
Rehab. CG Amphitheater			
stage	\$26,200	\$5,000	\$31,200
seating	\$45,850	\$8,750	\$54,600
screen	\$4,585	\$875	\$5,460
audio/visual booth	\$17,030	\$3,250	\$20,280
sound system	\$19,650	\$3,750	\$23,400
lighting system	\$9,170	\$1,750	\$10,920
walkways	\$20,043	\$3,825	\$23,868
signage	\$2,620	\$500	\$3,120
parking	\$13,362	\$2,550	\$15,912
ramada w/info board	\$7,860	\$1,500	\$9,360
Science & Conference Ctr.	\$2,423,500	\$462,500	\$2,886,000
Plant Nursery			
greenhouse	\$149,340	\$28,500	\$177,840
ext. plant storage	\$3,210	\$613	\$3,822
material storage	\$2,620	\$500	\$3,120
equip. storage	\$10,480	\$2,000	\$12,480
covered storage	\$52,400	\$10,000	\$62,400
yard	\$5,240	\$1,000	\$6,240
Admin. Conversion	\$772,900	\$147,500	\$920,400

*Appendixes and Bibliography*

Ranger Operations & Fire Station	\$994,290	\$189,750	\$1,184,040
Ranger Office parking	\$16,506	\$3,150	\$19,656
Helicopter Pad	\$9,825	\$1,875	\$11,700
Paved road (2 lane)	\$540,375	\$103,125	\$643,500
Vegetative restoration (old road)	\$7,860	\$1,500	\$9,360
Parking area demolition	\$72,050	\$13,750	\$85,800
Expand Maintenance Facility			
Offices	\$353,700	\$67,500	\$421,200
Covered parking for park vehicles	\$596,050	\$113,750	\$709,800
Covered storage space	\$137,550	\$26,250	\$163,800
5' High concrete storage silos	\$38,973	\$7,438	\$46,410
Loading ramps (2)	\$22,270	\$4,250	\$26,520
Open air repair bays (1)	\$75,456	\$14,400	\$89,856
<b>Twin Peaks Subtotal</b>	<b>\$12,213,589</b>	<b>\$2,330,838</b>	<b>\$14,544,426</b>
ALAMO CANYON WASH CG			
Campsites (4)	\$9,432	\$1,800	\$11,232
Composting toilets	\$85,150	\$16,250	\$101,400
Parking (gravel)	\$6,681	\$1,275	\$7,956
<b>Alamo Canyon Subtotal</b>	<b>\$101,263</b>	<b>\$19,325</b>	<b>\$120,588</b>
QUITOBAQUITO MGMT. AREA			
Rehab. exist. to natural conditions	\$241,040	\$46,000	\$287,040
Trailhead parking	\$17,816	\$3,400	\$21,216
Orientation & Info signs	\$3,930	\$750	\$4,680
Composting toilets	\$85,150	\$16,250	\$101,400
<b>Quitobaquito Springs Subtotal</b>	<b>\$347,936</b>	<b>\$66,400</b>	<b>\$414,336</b>
PARK GENERAL			
Waysides	\$131,000	\$25,000	\$156,000
Wayside Exhibits	\$416,580	\$79,500	\$496,080
Plant ID labels for trails	\$10,480	\$2,000	\$12,480
Trails ( H = hardened for access)			
South Alamo Canyon	\$183,400	\$35,000	\$218,400
H Senita Basin Loop	\$349,770	\$66,750	\$416,520
Quitobaquito	\$91,700	\$17,500	\$109,200
H Bonita Well	\$23,318	\$4,450	\$27,768
H Grinding Holes	\$23,318	\$4,450	\$27,768
H Desert Garden Loop	\$29,148	\$5,563	\$34,710
H Ajo Valley Overlook	\$34,977	\$6,675	\$41,652
Puerto Blanco Loop	\$412,650	\$78,750	\$491,400
Loop @ Diaz Spire	\$275,100	\$52,500	\$327,600
Twin Peaks	\$160,475	\$30,625	\$191,100
H Sonoran Desert @ N. Entr.	\$23,318	\$4,450	\$27,768
Improve Park Info Signs	\$3,930	\$750	\$4,680
Replace speedlimit signs	\$17,292	\$3,300	\$20,592
<b>Park General Subtotal</b>	<b>\$2,186,456</b>	<b>\$417,263</b>	<b>\$2,603,718</b>
<b>Grand Total</b>	<b>\$14,849,243</b>	<b>\$2,833,825</b>	<b>\$17,683,068</b>

## ALTERNATIVE 2

Feb. 24, 1995

<u>Cost Item</u>	<u>Gross Constr. Cost</u>	<u>Advance Planning Cost</u>	<u>Total Costs</u>
<b>TWIN PEAKS</b>			
Visitor Center	\$1,257,600	\$240,000	\$1,497,600
Rehab. CG Amphitheater			
stage	\$26,200	\$5,000	\$31,200
seating	\$45,850	\$8,750	\$54,600
screen	\$4,585	\$875	\$5,460
audio/visual booth	\$17,030	\$3,250	\$20,280
sound system	\$19,650	\$3,750	\$23,400
lighting system	\$9,170	\$1,750	\$10,920
walkways	\$20,043	\$3,825	\$23,868
signage	\$2,620	\$500	\$3,120
parking	\$13,362	\$2,550	\$15,912
ramada w/info board	\$7,860	\$1,500	\$9,360
Modular office bldg. (res. ctr.)	\$302,610	\$57,750	\$360,360
Ranger Operations & Fire Station	\$994,290	\$189,750	\$1,184,040
Ranger Office parking	\$16,506	\$3,150	\$19,656
<b>Twin Peaks Subtotal</b>	<b>\$2,737,376</b>	<b>\$522,400</b>	<b>\$3,259,776</b>
<b>QUITOBAQUITO MGMT. AREA</b>			
Trailhead parking	\$17,816	\$3,400	\$21,216
Orientation & Info signs	\$3,930	\$750	\$4,680
Composting toilets	\$85,150	\$16,250	\$101,400
<b>Quitobaquito Springs Subtotal</b>	<b>\$106,896</b>	<b>\$20,400</b>	<b>\$127,296</b>
<b>PARK GENERAL</b>			
Waysides	\$19,650	\$3,750	\$23,400
Wayside Exhibits	\$117,900	\$22,500	\$140,400
V.C. Accessible Nature Trail	\$11,135	\$2,125	\$13,260
Campground Accessible Perim. Trail	\$111,350	\$21,250	\$132,600
Improve Park Info Signs	\$3,930	\$750	\$4,680
<b>Park General Subtotal</b>	<b>\$263,965</b>	<b>\$50,375</b>	<b>\$314,340</b>
<b>Grand Total</b>	<b>\$3,108,237</b>	<b>\$593,175</b>	<b>\$3,701,412</b>

## APPENDIX C: THREATENED and ENDANGERED PLANT SPECIES

**Table 2. Threatened, Endangered, and Candidate Plant Species Known to Occur within Organ Pipe Cactus National Monument.**

Species	Status		Comments
	U.S. Fish and Wildlife Service <sup>1</sup>	Arizona Game and Fish Dept. <sup>2</sup>	
Plants			
acuña cactus ( <i>Echinomastus erectocentrus</i> var. <i>acunensis</i> )	Candidate (Category 1)	Highly Safeguarded	Found only in Acuña Basin.
Trelease agave ( <i>Agave schottii</i> var. <i>treleasei</i> )	Candidate (Category 2)	Highly Safeguarded	Found only in the Ajo Mountains.

### <sup>1</sup>U.S. Fish and Wildlife Service (USFWS)

**Endangered** = Denotes a species that is in danger of extinction throughout all or a significant portion of its range. Listed by the USFWS as endangered under the Endangered Species Act.

**Threatened** = Denotes a species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Listed by the USFWS as threatened under the Endangered Species Act.

**Candidate (Category 1)** = Species determined by the USFWS to be appropriate for listing as endangered or threatened, but is currently precluded due to other listing priorities; proposals are anticipated.

**Candidate (Category 2)** = Species being considered by USFWS for listing as endangered or threatened; additional data is required to support such action.

### <sup>2</sup>Arizona Game and Fish Department (AGFD)

**Highly Safeguarded** = As defined by the Arizona Native Plant Law (1990); those species of native plants and plant parts whose prospects for survival are in jeopardy or which are in danger of extinction.

Table 3. Rare and Sensitive Plant Species Known to Occur within Organ Pipe Cactus National Monument.

Critical Species <sup>1</sup>	Comments
Trelease agave ( <i>Agave schottii</i> var. <i>treleasei</i> )	Known only from Bull Pasture in the Ajo Mountains.
snapdragon ( <i>Antirrhinum watsonii</i> )	At northern range limit; only known locality in U.S.
desert tree caper ( <i>Atamisquea emarginata</i> )	At northern range limit; only known locality in U.S.
Kofa mountain barberry ( <i>Berberis harrisoniana</i> )	Known only from SW Arizona in Kofa and Ajo Mountains.
chiltepin ( <i>Capsicum annuum</i> var. <i>glabriusculum</i> )	At northern range limit in southern Arizona.
acuña cactus ( <i>Echinomastus erectocentrus</i> var. <i>acunensis</i> )	At western range limit for this variety.
graptopetalum ( <i>Graptopetalum rusbyi</i> )	Endemic to and occurs throughout southern Arizona.
ashy jatropa ( <i>Jatropha cinerea</i> )	At northern range limit; frost-sensitive.
senita cactus ( <i>Lophocereus schottii</i> )	At northern range limit; frost-sensitive.
Sonoran milkweed vine ( <i>Matelea cordifolia</i> )	At northern range limit.
mimosa ( <i>Mimosa laxiflora</i> )	At northern range limit.
dahlia-rooted cereus ( <i>Cereus striata</i> )	At northern range limit; probably limited by low temperatures.
Ajo rock daisy ( <i>Perityle ajoensis</i> )	Possibly endemic to the Ajo Mountains.
sandpaper plant ( <i>Petalonyx linearis</i> )	At northeast range limit.
Hind's nightshade ( <i>Solanum hindianum</i> )	At northern range limit; frost-sensitive.
Tumamoc globeberry ( <i>Tumamoca macdougali</i> )	At western range limit.
Arizona rosewood ( <i>Vaquelinia californica</i> ssp. <i>sonoriensis</i> )	At northern range limit; only known locality in U.S.
Sensitive Species <sup>2</sup>	Comments
elephant tree ( <i>Bursera microphylla</i> )	Frost-sensitive; damaged or killed by prolonged freezing.
dudleya ( <i>Dudleya pulverulenta</i> )	Low density throughout its range; prone to illegal collecting.
California barrel cactus ( <i>Ferocactus cylindraceus</i> var. <i>cylindraceus</i> )	Possibly at eastern range limit. Variety may occur in the monument; has not been positively identified.
golden barrel cactus ( <i>F. cylindraceus</i> var. <i>eastwoodiae</i> )	May occur; variety has not been positively identified.
jacquemontia ( <i>Jacquemontia pringlei</i> )	Possibly at western range limit.
Mexican shrub mallow ( <i>Malvastrum bicuspidatum</i> )	At northern range limit.
Thornber's fishhook cactus ( <i>Mammillaria thornberi</i> )	Species prone to illegal collecting.
desert night-blooming cereus ( <i>Cereus greggii</i> var. <i>transmontanus</i> )	Rare throughout its range; occurs sporadically within the monument.
Ajo oak ( <i>Quercus ajoensis</i> )	Occurs in Alamo and Arch canyons in the Ajo Mountains.
organ pipe cactus ( <i>Stenocereus thurberi</i> )	At northern range limit; frost-sensitive.

<sup>1</sup>Species that are vulnerable to drastic population decreases and/or extirpation.<sup>2</sup>Species prone to unpredictable population fluctuations, although extirpation from the monument and surrounding area is unlikely.

## APPENDIX D: THREATENED and ENDANGERED WILDLIFE SPECIES

**Table 4. Threatened, Endangered, and Candidate Wildlife Species Known to Occur within Organ Pipe Cactus National Monument.**

Species	Status		Comments
	Birds	U.S. Fish and Wildlife Service <sup>1</sup>	
American peregrine falcon ( <i>Falco peregrinus anatum</i> )	Endangered	Candidate	Rare; most sightings have been from the Ajo Mountains.
cactus ferruginous pygmy-owl ( <i>Glaucidium brasilianum cactorum</i> )	Candidate (Category 1)	Endangered	Uncommon permanent resident. Occurs in washes, canyons, and saguaro stands.
loggerhead shrike ( <i>Lanius ludovicianus</i> )	Candidate (Category 2)		Rare summer and common winter resident; found throughout the monument.
tropical kingbird ( <i>Tryannus melancholicus</i> )		Candidate	Very rare; only 3 recorded sightings. Last reported sighting was June 1976 at Quitobaquito Pond.
ferruginous hawk ( <i>Buteo regalis</i> )	Candidate (Category 2)	Threatened	Very rare; only 4 recorded sightings. Last reported sighting was February 1982.
brown pelican ( <i>Pelecanus occidentalis</i> )	Endangered		Very rare; only 4 recorded sightings. Last reported sighting was July 1972 at Quitobaquito Pond.
white-faced ibis ( <i>Plegadis chihi</i> )	Candidate (Category 2)	Threatened	Very rare; last reported sighting was April 1982.
osprey ( <i>Pandion haliaetus</i> )		Threatened	Rare transient; recorded at Quitobaquito Pond, Burro Spring, William's Spring, and along Highway 85.
great egret ( <i>Casmerodius albus</i> )		Endangered	Uncommon spring and rare fall transient; recorded at open water or flying over monument.
snowy egret ( <i>Egretta thula</i> )		Threatened	Uncommon transient.
least bittern ( <i>Ixobrychus exilis</i> )		Candidate	Very rare; 3 recorded sightings, all at Quitobaquito Pond. Last reported sighting was April 1975.
common black-hawk ( <i>Buteogallus anthracinus</i> )		Candidate	Rare transient; recorded at Quitobaquito, Aguajita Spring, and Puerto Blanco Drive.
crested caracara ( <i>Polyborus plancus</i> )		Candidate	Rare transient; recorded sporadically throughout the year.
black rail ( <i>Laterallus jamaicensis</i> )	Candidate (Category 2)	Endangered	Very rare; 3 recorded sightings, all at Quitobaquito Pond. Last reported sighting was March 1984.
willow flycatcher ( <i>Empidonax traillii</i> )		Endangered	Rare spring and irregular fall transient.
Sprague's pipit ( <i>Anthus spragueii</i> )		Candidate	Very rare; 3 recorded sightings. Last reported sighting was November 1968 at the monument's sewage lagoon.

Species	Status		Comments
	U.S. Fish and Wildlife Service	Arizona Game and Fish Department	
<b>Mammals</b>			
Sonoran pronghorn ( <i>Antilocapra americana sonoriensis</i> )	Endangered	Endangered	Recovery plan first prepared by USFWS (12/82); revised plan (draft) recently released (9/94).
lesser long-nosed bat ( <i>Leptonycteris curasoae yerbabuena</i> )	Endangered	Endangered	Largest known maternity colony in U.S.; recovery plan (draft) prepared by USFWS (1/94).
California leaf-nosed bat ( <i>Macrotus californicus</i> )	Candidate (Category 2)	Candidate	Year-round resident; roosts in caves and mine adits.
Underwood's mastiff-bat ( <i>Eumops underwoodi</i> )	Candidate (Category 2)		Known in the monument only from Quitobaquito. Probably roosts in rock crevices on steep cliffs.
greater western mastiff-bat ( <i>Eumops perotis californicus</i> )	Candidate (Category 2)		Day roosts located in rock crevices on steep cliffs.
<b>Reptiles</b>			
desert tortoise (Sonoran population) ( <i>Gopherus agassizii</i> )	Candidate (Category 2)	Candidate	Mohave (CA) and Beaver Dam Slope (AZ/UT) populations are already listed as endangered.
chuckwalla ( <i>Sauromalus obesus</i> )	Candidate (Category 2)		Obligate rock-dweller. Relatively abundant and widely distributed throughout the monument.
canyon spotted whiptail ( <i>Cnemidophorus burti</i> )	Candidate (Category 2)		Largest known population of the species is in the Ajo Mountains.
Mexican rosy boa ( <i>Lichanura trivirgata</i> )	Candidate (Category 2)		Significantly impacted by highway mortality along State Route 85.
<b>Fish</b>			
Quitobaquito desert pupfish ( <i>Cyprinodon macularius eremus</i> )	Endangered	Endangered	Endemic to Quitobaquito pond/spring outflows; designated critical habitat. Recovery plan prepared by USFWS (9/93).
<b>Invertebrates</b>			
Quitobaquito snail ( <i>Tryonia quitobaquiae</i> )	Candidate (Category 2)		Endemic to pond and spring outflows at Quitobaquito.

<sup>1</sup>US Fish and Wildlife Service (USFWS)

**Endangered** = Denotes a species that is in danger of extinction throughout all or a significant portion of its range. Listed by the USFWS as endangered under the Endangered Species Act.

**Threatened** = Denotes a species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Listed by the USFWS as threatened under the Endangered Species Act.

**Candidate (Category 1)** = Species determined by the USFWS to be appropriate for listing as endangered or threatened, but is currently precluded due to other listing priorities; proposals are anticipated.

**Candidate (Category 2)** = Species being considered by USFWS for listing as endangered or threatened; additional data is required to support such action.

<sup>2</sup>Arizona Game and Fish Department (AGFD)

**Endangered** = Species for which extinction or extirpation is highly probable without conservation efforts. Listed as endangered on the AGFD's list of Threatened Native Wildlife in Arizona.

**Threatened** = Species or subspecies whose continued presence in Arizona could be in jeopardy in the near future. Serious threats have been identified and populations are either lower than they were historically or are extremely local and small. Listed as threatened on the AGFD's list of Threatened Native Wildlife in Arizona.

**Candidate** = Species with known or suspected threats, but for which substantial population declines from historical levels have not been documented. Listed as a state candidate on AGFD's list of Threatened Native Wildlife in Arizona.

**Highly Safeguarded** = As defined by the Arizona Native Plant Law (1990); those species of native plants and plant parts whose prospects for survival are in jeopardy or which are in danger of extinction.

## APPENDIX E: CULTURAL COMPLIANCE REQUIREMENTS

### SECTION 106 AND SECTION 110 COMPLIANCE REQUIREMENTS

Alternative 1, the proposed action for Organ Pipe Cactus National Monument, would comply with both section 106 and section 110 of the 1966 National Historic Preservation Act, as amended. It would also comply with the implementing regulations of this law, contained in *Regulations for the Protection of Historic and Cultural Properties*, 36 Code of Federal Regulations (CFR) 800, the *NPS Management Policies* (1988), and the *Cultural Resources Management Guideline*, known as NPS-28 (1985).

Organ Pipe Cactus National Monument contains properties and sites listed in, or that may be determined eligible for listing in, the National Register of Historic Places. Consequently, and in accord with the legislation, regulations, and guidelines, actions that may affect these properties and sites, such as the approval and ultimate implementation of the proposed action, are subject to review and comment by the Arizona State Historic Preservation Officer and the Advisory Council on Historic Preservation.

Pursuant to 36 CFR 800, the Advisory Council on Historic Preservation, the National Conference of State Historic Preservation Officers, and the National Park Service have executed a programmatic memorandum of agreement related to the planning process. The Advisory Council and the Arizona State Historic Preservation Officer have participated in the development of this plan through informal consultations and formal briefings and reviews. The topics under review include treatment of properties and sites on or eligible for the national register and consultations about archeological and ethnographic resources with interested American Indians.

Interaction would continue with the Advisory Council and the Arizona State Historic Preservation Officer throughout the planning process, and each would be given the opportunity to review formally and comment on the proposed action before it is approved by the Western Regional Director of the NPS. Evidence of compliance with section 106 of the National Historic Preservation Act of 1966 will be included in the final plan in compliance with the National Environmental Policy Act of 1969 (Public Law 91-190, 83 Stat. 852).

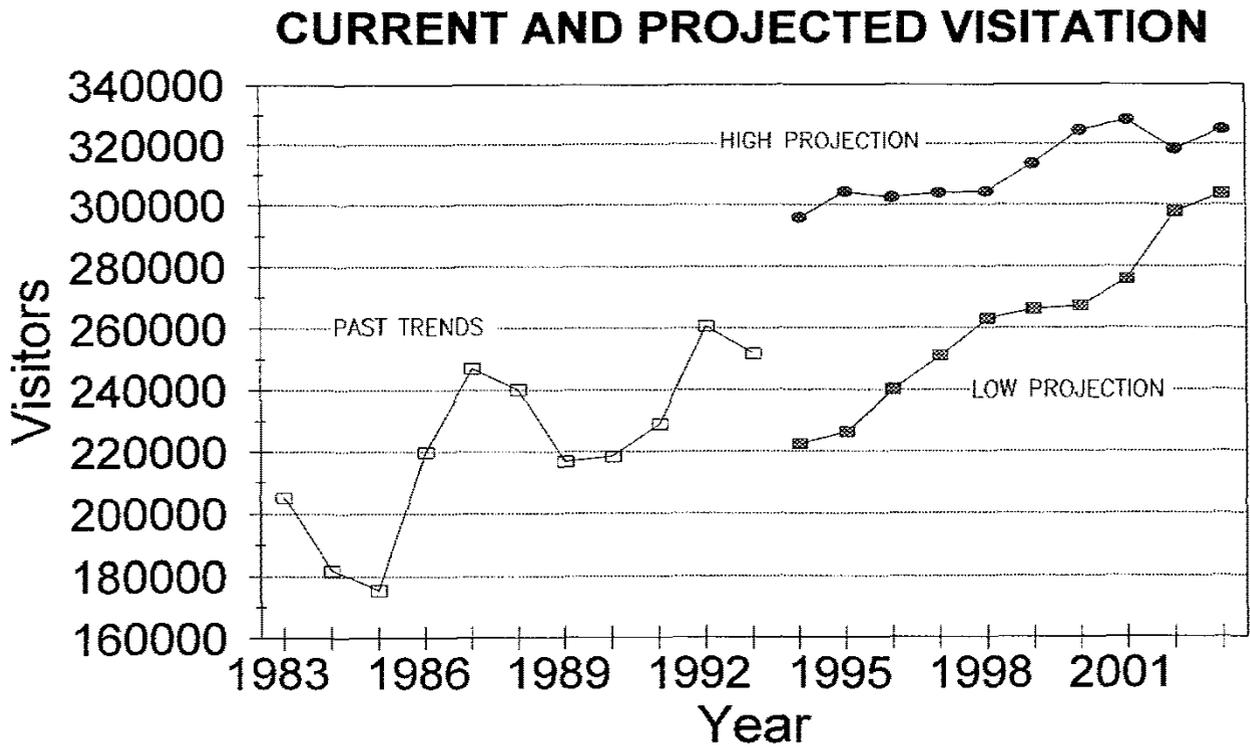
Actions that meet the criteria of programmatic exclusions, as stipulated in the August 15, 1990, programmatic agreement among the National Conference of State Historic Preservation Officers, the Advisory Council on Historic Preservation, and the NPS, will be evaluated, reviewed, and documented internally by the NPS through assessment of effects forms. Archeological surveys will be conducted prior to ground-disturbing actions and archeological clearances obtained as stipulated in the November 21, 1979, agreement between the National Conference of State Historic Preservation Officers and the NPS. Archeological clearance is documentation that a given action will have no effect on archeological resources. Proposed actions herein not meeting the programmatic exclusion definition may be determined to need no further review under section 106 of the National Historic Preservation Act of 1966, as amended. Such agreements, however, must be determined mutually and must be fully documented. Actions not covered by the above must undergo full section 106 procedures as stipulated in 36 CFR 800. The NPS will consult the state historic preservation officer and the Advisory Council on Historic Preservation as appropriate on any such actions.

The programmatic agreement calls for the systematic inventorying of cultural resources following the *Guidelines for Federal Agency Responsibilities* under section 110 of the National Historic Preservation Act. The priorities determined by the park's resource management plan serve as a guide. These priorities would be used to tie into programmatic sources of funding such as monies from the Applied Ethnography Program, the Historic Preservation Fund, and the Systemwide Archeological Inventory Program.

The park maintains an ongoing dialogue with Hia-Ced O'odham and Tohono O'odham Indian groups who have expressed an interest in certain areas of the park, such as Quitobaquito Springs, and in park archeological and ethnographic collections curated at the Western Archaeological and Conservation Center of the NPS in Tucson, Arizona. The park would continue complying with the Native American Graves Protection and Repatriation Act of 1990. During the past four years, the park participated in successful stages of the repatriation of human remains and associated artifacts with a Hia-Ced O'odham group.

## APPENDIX F: PROJECTED VISITATION

Table 11. Projected Visitation Figures Based on Past Trends



**APPENDIX G:  
CONSULTATIONS WITH U.S. FISH AND WILDLIFE SERVICE  
AND ARIZONA GAME AND FISH DEPARTMENT**



**GAME & FISH DEPARTMENT**

2221 West Greenway Road, Phoenix, Arizona 85023-4399 (602) 942-3000

*Governor*  
Eife Symington

*Commissioners:*  
Chairman Elizabeth T. Woodio, Tucson  
Arthur Porter, Phoenix  
Nonie Johnson, Snowflake  
Michael M. Golightly, Flagstaff  
Herb Guenther, Tacna

*Director*  
Duane L. Shroufe

*Deputy Director*  
Thomas W. Spalding

February 24, 1995

Ms. Liz Bellantoni  
National Parks Service, Denver Service Center-TWE  
Box 25287  
Denver, Colorado 80225

Re: Special Status Species; Organ Pipe Cactus National Monument,  
Arizona

Dear Ms. Bellantoni:

The Arizona Game and Fish Department (Department) has received your request of February 24, 1994, regarding special status species for above-referenced area and the following information is provided.

The Department's Heritage Data Management System has been accessed and current records show that the special status species on the attached list have been documented as occurring in Organ Pipe Cactus National Monument.

Thank you for the opportunity to provide this information. If you have any questions, please contact me at (602) 789-3600.

Sincerely,



Nancy Olson  
Project Evaluation Specialist  
Habitat Branch

NLO:no

Enclosure

AGFD# 02-24-95(03)



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
ARIZONA ECOLOGICAL SERVICES STATE OFFICE  
3616 West Thomas Road, Suite 6  
Phoenix, Arizona 85019



Telephone: (602) 379-4720 FAX: (602) 379-6629

June 16, 1994

In Reply Refer To:  
AESO/ES

MEMORANDUM

TO: Natural Resource Specialist, Denver Service Center-TWE, National Park Service, Denver, Colorado (Attn: Liz Bellantoni)

FROM: State Supervisor

SUBJECT: Species List for Organ Pipe Cactus National Monument

This memorandum is in response to your June 2, 1994, request for information and review of listed or proposed threatened or endangered species and candidate species that may occur on Organ Pipe Cactus National Monument, Pima County, Arizona. We are providing an updated list which includes the species that were added by the park based on confirmed sightings. Attached are copies of the tables that you provided and requested updated species status.

Our data indicate the following listed and candidate species may occur on Organ Pipe Cactus National Monument:

Endangered

Lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*)  
Sonoran pronghorn (*Antilocapra americana sonoriensis*)  
American peregrine falcon (*Falco peregrinus anatum*)  
Brown pelican (*Pelecanus occidentalis*)  
Desert pupfish (*Cyprinodon macularis*)

Candidate Category 1

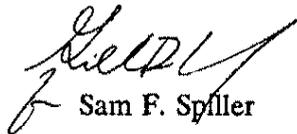
Cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*)  
Acuna cactus (*Echinomastus erectocentrus* var. *acunensis*)

Candidate Category 2

California leaf-nosed bat (*Macrotus californicus*)  
Greater western mastiff-bat (*Eumops perotis californicus*)  
Underwood's mastiff-bat (*Eumops underwoodi*)  
Loggerhead shrike (*Lanius ludovicianus*)

White-faced ibis (*Plegadis chihi*)  
Ferruginous hawk (*Buteo regalis*)  
Black rail (*Laterallus jamaicensis*)  
Desert tortoise (Sonoran population) (*Gopherus agassizii*)  
Chuckwalla (*Sauromalus obesus*)  
Rosy boa (*Lichanura trivirgata*)  
Canyon spotted whiptail (*Cnemidophorus burti*)  
Quitobaquito tryonia (snail) (*Tryonia quitobaquitae*)  
Trelease agave (*Agave schottii* var. *treleaseii*)

In future communications on this project, please refer to consultation number 2-21-89-I-078.  
If we may be of further assistance, please contact Brenda Andrews or Tom Gatz.



Sam F. Spiller

cc: Superintendent, Organ Pipe Cactus National Monument, Luke, Arizona  
Director, Arizona Game and Fish Department, Phoenix, Arizona

Attachment

## LIST OF ABBREVIATIONS

The following is a list of abbreviations used in this document

ADOT	Arizona Department of Transportation
AGFD	Arizona Game and Fish Department
ASHPO	Arizona State Historic Preservation Officer
B.C.E.	Before the Common Era
C.E.	Common Era
CFR	Code of Federal Regulations
DCP	Development Concept Plan
FTE	Full Time Equivalent
GMP	General Management Plan
IP	Interpretive Prospectus
ISDA	International Sonoran Desert Alliance
MAB	Man and the Biosphere
NAFTA	North American Free Trade Agreement
NCRMP	Natural and Cultural Resource Management Plan
NEPA	National Environmental Policy Act
NM	National Monument
NPS	National Park Service
RV	Recreational Vehicle
UNESCO	United Nations Educational, Scientific, and Cultural Organization
USFWS	United States Fish and Wildlife Service
VIP	Volunteers-in-Parks
WACC	Western Archaeological and Conservation Center

## BIBLIOGRAPHY

Addison-Sorey, Andrea.

- 1989 "Tohono O'odham Salt Pilgrimages." Center for the Study of Deserts and Oceans (CEDO) News 2 (1, Spring/Summer 1989) 17-18, 20.

Alvarez, Robert R. and George A. Collier.

- 1994 "The Long Haul in Mexican Trucking: Traversing the Borderlands of the North and the South." *American Ethnologist* 21(3, August):606-627.

Anderson, Keith M.

- 1985 "The Quitobaquito Cemetery: Sand Papago Case History." *Journal of the American Society for Conservation Archeology* 12 (1985):20-28.

Anderson, Keith M., Fillman Bell, and Yvonne G. Stewart.

- 1982 "Quitobaquito: A Sand Papago Cemetery." *The Kiva* 47(4, 1982):215-237.

Antone, Geraldine (member of the San Xavier O'odham Reservation and the Tohono O'odham Nation).

- 1990 Interview with Lawrence F. Van Horn, National Park Service cultural anthropologist of the Denver Service Center, at Organ Pipe Cactus National Monument, Arizona, January 19, 1990.
- 1992 Interview with Lawrence F. Van Horn, National Park Service cultural anthropologist of the Denver Service Center, at the Western Archeological and Conservation Center of the National Park Service, Tucson, Arizona, July 14, 1992.

Appleman, Roy E. and Russell Jones.

- 1969 "[Dos Lomitas] Ranch: Historic Structures Report, Parts I and II, Organ Pipe Cactus National Monument, Arizona." Washington, D.C.: National Park Service, Office of Archeology and Historic Preservation.

Arizona Department of Transportation

- 1991 *The Effects of Free Trade with Mexico on Arizona's Highways*, Transportation Planning Division.

Arizona Department of Agriculture.

- 1993 "Arizona Native Plant Program." 2pp.

Barney, James M.

- 1943 "El Camino del Diablo." *Arizona Highways* 19(3).

Bell, Fillman, Keith M. Anderson, and Yvonne G. Stewart.

- 1980 "The Quitobaquito Cemetery and Its History." Tucson, Arizona: Western Archeological and Conservation Center, National Park Service.

Bennett, Peter S. and Michael R. Kunzmann.

- "A History of the Quitobaquito Resource Management Area, Organ Pipe Cactus National Monument, Arizona." Tucson: Cooperative National Park Resources Studies Unit, University of Arizona, Technical Report Number 26.

Bloomquist, Dick.

- 1978 "Quitobaquito." *Arizona Highways* 54(4):38-46.

Bowden, Charles.

- 1977 *Killing the Hidden Waters: The Desert and Groundwater Problems*. Austin: University of Texas Press.
- 1989 Photographs by Jack Dykinga. "The Importance of Being Nothing: A Trip into the Pinacate [Sonora, Mexico] -- Empty Quarter of the Sonoran Desert." *National Parks Magazine* 63(9 and 10, September and October):26-31.

- 1993 Photographs by Jack Dykinga. "The Sonoran Desert: Arizona, California, Mexico." *Arizona Highways* 69(6, June 1993):14-21. Excerpted from *The Sonoran Desert: Arizona, California, Mexico*. Text by Charles Bowden; photographs by Jack Dykinga. New York: Harry N. Abrams, Incorporated.
- Brown, B.  
1991 *Land Use Trends Surrounding Organ Pipe Cactus National Monument*. Cooperative National Park Resources Studies Unit Technical Report Number 39. University of Arizona, Tucson. 65pp.
- Brown, B. T., L. P. Hendrickson, R. R. Johnson, and W. Werrell.  
1983 *An Inventory of Surface Water Resources at Organ Pipe Cactus National Monument, Arizona*. Cooperative National Park Resources Studies Unit Technical Report 10. University of Arizona, Tucson. 97pp.
- Brown, William E. and Wilton E. Hoy.  
1967 "Historic Sites and Structures Inventory for Organ Pipe Cactus National Monument, Arizona." Ajo, Arizona: Organ Pipe Cactus National Monument. Manuscript on file at the monument.
- Broyles, Bill.  
1988a "El Camino del Diablo: Highway of the Devil." Ajo, Arizona: Cabeza Prieta National Wildlife Refuge, United States Fish and Wildlife Service, 1988a.  
1988b "El Camino del Diablo: The Devil's Highway." *Arizona Highways* 64(10, October 1988).  
1989 "Cabeza Prieta: An Austerely Beautiful 860,010 Acre Refuge for Sonoran Desert Wildlife." *Arizona Highways* 65(11, November 1989):4-15.  
1993 Telephone interview with Lawrence F. Van Horn, National Park Service cultural anthropologist, Tucson, Arizona, March 1, 1993. Notes on file, Branch of Planning, Western Team, Denver Service Center, National Park Service, Denver, Colorado.
- Bryan, Kirk.  
1925 *The Papago County, Arizona: A Geographic, Geologic, and Hydrologic Reconnaissance with A Guide to Desert Watering Places*. Washington, D.C.: United States Government Printing Office.
- Bowers, J.  
1980 Flora of Organ Pipe Cactus National Monument. *Journal of the Arizona Academy of Sciences* 15:1-11, 15:33-47.
- Butler, B. S. and J. V. Lewis  
1940 "Mineralization in the Organ Pipe Cactus National Monument, Arizona." Organ Pipe Cactus National Monument, Arizona. Typewritten report. 32pp.
- Chamberlin, E.  
1972 "Soil Survey: A Special Report. Organ Pipe Cactus National Monument, Pima County, Arizona." U.S. Department of Agriculture, Soil Conservation Service. Phoenix, Arizona. 37pp.
- Cipriano, Juan Joe.  
1989 (member of the Hia-Ced O'odham people and the Tohono O'odham Nation). Interview with Lawrence F. Van Horn, National Park Service cultural anthropologist, Organ Pipe Cactus National Monument, Arizona, January 24, 1989. Audio tape on file, Organ Pipe Cactus National Monument, Arizona.
- Clemensen, A. Berle.  
1987 "Cattle, Copper, and Cactus: The History of Saguaro National Monument, Arizona." Denver: Denver Service Center, National Park Service.
- Cochran, Carol, Mark Dimmitt, Howard Lawler, Peter Siminski, and Dave Thayer.  
1990 "A Pinacate Adventure." *Sonorensis* 10 (3, Winter 1990): 2-13.

## Appendixes and Bibliography

- Cockrum, E. L., and Y. Petryszyn  
1986 *Mammals of the Organ Pipe Cactus National Monument*. Cooperative National Park Resources Studies Unit Special Report 5. University of Arizona, Tucson. 90pp.
- Cook, Charles A.  
1967 "A Documentation of the Arizona Papagueria with Special Reference to Organ Pipe Cactus National Monument." Ajo, Arizona: Organ Pipe Cactus National Monument, 1967. Typescript on file at the monument.
- Crosswhite, Frank S.  
1980 "The Annual Saguaro Harvest and Crop Cycle of the Papago with Reference to Ecology and Symbolism." *Desert Plants* 2 (Spring 1980):3-61.
- Crown, Patricia L.  
1994 *Ceramics and Ideology*. The University of New Mexico Press, Albuquerque.
- Di Peso, Charles C.  
1979 "Prehistory: O'otam." In *Handbook of North American Indians: Volume 9, Southwest*. William C. Sturtevant, general editor; Alfonso Ortiz, volume editor. Pages 91-99. Washington, District of Columbia: Smithsonian Institution.
- Dollar, Tom.  
1991 "Rediscover Ajo." *Arizona Highways* 67(2, February 1991):38-45.  
1994 (With photographs by Jack Dykinga). "The World of the Borderlands: People of the Borderlands." *Arizona Highways* 70(3, March 1994):4-11.
- Etulain, Richard W.  
1994 "Frontier, Region, and Border: Cultural Currents in the Recent Southwest." *Montana The Magazine of Western History* 44(1, Winter 1994):64-70.
- Ezell, Paul H.  
1951 Field notes. Ms. on file. Western Archeological and Conservation Center, National Park Service. Tucson.  
1952 "An Archeological Survey of Organ Pipe Cactus National Monument and Adjacent Areas--A Preliminary Report." Ajo, Arizona: Organ Pipe Cactus National Monument, 1952. Typescript on file at the monument, Archives Accession Number 736.  
1954 "An Archeological Survey of Northwestern Papagueria." *The Kiva* 19(2, 3 and 4, Spring 1954):1-26.  
1955 The archaeological delineation of a cultural boundary in Papagueria. *American Antiquity* 20:367-74.
- Felger, Richard S.  
1990 *Non-native Plants of Organ Pipe Cactus National Monument, Arizona*. Cooperative National Park Resources Studies Unit Technical Report 31. University of Arizona, Tucson. 94pp.
- Felger, Richard S., Peter L. Warren, L. Susan Anderson, and Gary P. Nabhan.  
1992 "Vascular Plants of a Desert Oasis: Flora and Ethnobotany of Quitobaquito, Organ Pipe Cactus National Monumento, Arizona." *Proceedings of the San Diego Society of Natural History* 8(June 1992):1-39.
- Flores, Floyd.  
1985 "Plant Food Plants: Findings and Implementation Method -- Community Garden Project, O'odham Spirit 1984-1985." Sells, Arizona: Hia-Ced O'odham Program, Tohono O'odham Nation, 1985. Typescript on file at the office of the Hia-Ced O'odham Program.

Fontana, Bernard L.

- 1977 Letter from Field Historian Bernard L. Fontana, University of Arizona Library and Arizona State Museum to Chief Archeologist Keith M. Anderson, Western Archeological and Conservation Center, National Park Service, Tucson, Arizona, September 12, 1977. On file, Organ Pipe Cactus National Monument, Ajo, Arizona.
- 1981 *Of Earth and Little Rain: The Papago Indians*. Flagstaff, Arizona: Northland Press, 1981.
- 1983 "The Papagos. *Arizona Highways* 59 (April 1983):34-46, 49.
- 1994 Telephone conversation with Lawrence F. Van Horn, National Park Service cultural anthropologist, Tucson, Arizona, April 26, 1994. Notes on file, Branch of Planning, Western Team, Denver Service Center, National Park Service, Denver, Colorado.

Galinier, Jacques.

- 1991 "From Montezuma to San Francisco: The Wigita Ritual in Papago Religion." *Journal of the Southwest* 33 (4, Winter 1991):486-538).

Gladwin, Harold S. and Winifred J.

- 1929 *The Red-on-buff Culture of Papaguera*. Medallion Papers No IV. Gila Pueblo. Globe, Arizona.

Greater Phoenix Economic Council

- 1994 "Greater Phoenix by the Numbers." Phoenix, Arizona.

Greater Tucson Economic Council

- 1994 "Pima County Economic Indicators." Tucson, Arizona.

Great Western Research.

- 1989 Erosion Control Studies at Armenta Ranch and Dos Lomitas, Organ Pipe Cactus National Monument. Contract Number: CX800-7-0031. 54 pp.

Greenberg, James B. and C. Velez-Ibanez

- 1993 "Community Dynamics in a Time of Crisis: An Ethnographic Overview of the Upper Gulf." Ppg 12-28 IN *Maritime Community and Biosphere Reserve: Crisis and Response in the Upper Gulf of California*. Occasional Paper #2. Bureau of Applied Research and Anthropology, University of Arizona, Tucson, AZ. Thomas R. McGuire and James B. Greenberg, Editors.

Greene, Jerome A.

- 1977a "Historic Resource Study: Organ Pipe Cactus National Monument, Arizona." Denver: Denver Service Center, National Park Service, 1977a.

Groschupf, K. D., B. T. Brown, and R. R. Johnson

- 1987 "A Checklist of the Birds of Organ Pipe Cactus National Monument."
- 1988 An Annotated Checklist of the Birds of Organ Pipe Cactus National Monument, Arizona. Southwest Parks and Monuments Association. 45pp.

Hackenberg, Robert A.

- 1964 "Aboriginal Land Use and Occupancy of the Papago Indians." Washington, D.C.: United States Department of Justice, Lands Division, 1964. Contract number J-40974. Report on file, Western Archeological and Conservation Center, National Park Service, Tucson, Arizona.

Hartmann, William K.

- 1990 *Desert Heart: Chronicles of the Sonoran Desert*. Tucson, Arizona: Fisher Books.

Haury, Emil W.

- 1950 *The Stratigraphy and Archaeology of Ventana Cave*. University of Arizona Press, Tucson. Republished in 1975.

## Appendixes and Bibliography

Hayden, Julian D.

- 1965 Fragile-pattern Areas. *American Antiquity* 31:272-276.
- 1967 "A Summary Prehistory and History of the Sierra Pinacate, Sonora." *American Antiquity* 32:335-344.
- 1972 "Hohokam Petroglyphs of the Sierra Pinacate, Sonora, and the Hohokam Shell Expeditions." *Kiva* 37:74-84.
- 1976 "Pre-altithermal Archaeology in the Sierra Pinacate, Sonora, Mexico." *American Antiquity* 41:274-289.
- 1983 "Guide to the Sierra del Pinacate." Ajo, Arizona: Organ Pipe Cactus National Monument.
- 1993 Interview in person with Lawrence F. Van Horn, National Park Service cultural anthropologist, Tucson, Arizona, March 3, 1993. Notes on file, Branch of Planning, Western Team, Denver Service Center, National Park Service, Denver, Colorado.
- 1994a Interview in person with Lawrence F. Van Horn, National Park Service cultural anthropologist, Tucson, Arizona, April 17, 1994. Notes on file, Branch of Planning, Western Team, Denver Service Center, National Park Service, Denver, Colorado.
- 1994b Telephone conversation with Lawrence F. Van Horn, National Park Service cultural anthropologist, Tucson, Arizona, April 26, 1994. Notes on file, Branch of Planning, Western Team, Denver Service Center, National Park Service, Denver, Colorado.

Hornaday, William T.

- 1983 *Camp-Fires on Desert and Lava*. Tucson: University of Arizona Press, 1983. First published, New York: Charles Scribner's Sons, 1908.

Hoy, Wilton E.

- "A Quest for the Meaning of Quitobaquito." *The Kiva* 34(4):213-218.
- 1976 "Organ Pipe Cactus National Monument. Historical Research." Three Volumes: "Administrative, Early Period, and Frontier Period." Ajo, Arizona: Organ Pipe Cactus National Monument, 1970. Typescript on file at the monument. Revised and reprinted, Ajo, Arizona: Organ Pipe Cactus National Monument.
- 1993 *Spanish Terms of the Sonoran Desert Borderlands: A Basic Glossary*. Calexico, California: Institute for Border Studies, Imperial Valley Campus, San Diego State University.

Huckell, Bruce B

- 1984a *The Archaic Occupation of the Rosemont Area, Northern Santa Rita Mountains, Southeastern Arizona*. Archaeological Series No. 147. Arizona State Museum, Tucson.

Huey, L. M.

- 1942 *A Vertebrate Faunal Survey of the Organ Pipe Cactus National Monument, Arizona*. Transactions of the San Diego Society of Natural History. 9:353-376.

Hunt, Alice Parker.

- 1972 Archeological Survey Site Cards, Organ Pipe Cactus National Monument, Arizona. No report. Ajo, Arizona: Organ Pipe Cactus National Monument. Site cards on file at the monument, Archives Accession Number 279.

Hunt, C. B.

- 1972a "Roadside Geology, Organ Pipe Cactus National Monument." Unpublished Master's Thesis, Organ Pipe Cactus National Monument, Ajo, Ariz. 42pp.
- 1972b "Visitor's Guide to the Geology of Organ Pipe Cactus National Monument--a Sonoran Desert Landscape." Organ Pipe Cactus National Monument, Arizona. Typewritten paper. 73pp.

- Instituto Nacional De Estadística Geografía E Informática  
1990 "Censos Economicos 1989." Aguascalientes, Ags., Sonora, Mexico.
- Ives, Ronald L.  
1936 "Some Papago Migrations in the Sonoyta Valley." *Masterkey* (10):161-167.  
1989 *Land of Lava, Ash, and Sand: The Pinacate Region of Northwestern Mexico*. Foreword by James W. Byrkit. Introduction by Karen J. Dahood (editor). Tucson: Arizona Historical Society.
- Johnson, R. A., M. A. Baker, D. J. Pinkava, N. Trushell, and G. A. Ruffner  
1991 "Special Status Plants of Organ Pipe Cactus National Monument, Arizona: Sensitive Ecosystems Project Final Report." Ruffner Associates.
- Johnson, Eric.  
1993 "Organ Pipe [Cactus] National Monument, Arizona in Tune with Nature." *The (Denver, Colorado) Rocky Mountain News*, December 12, 1993, page 3T.
- Jones, W. C.  
1974 "General Geology of the Northern Portion of the Ajo Range, Pima County, Arizona." Master's Thesis, University of Arizona, Tucson. 77pp.
- Kaye, Glen.  
1994 "The Mexico-United States of America Border Region: The Filling of an Empty Space." *The George Wright Forum* 11(3):79-88.
- Keane, Melissa and A. E. Rogge.  
1992 "Gold and Silver Mining in Arizona, 1848-1945: A Context for Historic Preservation Planning." Phoenix, Arizona: Dames and Moore Intermountain Cultural Resource Services, Research Paper Number 6. Prepared for the State Historic Preservation Office, Arizona State Parks, Phoenix, Arizona.
- Kelly, Roger E. and Marsha C. S. Kelly.  
1983 "Arrastras: Unique Western Historic Mining Sites." *Historical Archaeology* 17(1):85-95.
- Kingsley, K. J.  
1991 Invertebrates of Organ Pipe Cactus National Monument, Arizona. Final Report. Contract Number: CX8000-7-0026. 194 pp.
- Lowe, C. H., and P. C. Rosen  
1992 "Ecology of the Amphibians and Reptiles at Organ Pipe Cactus National Monument, Arizona." Sensitive Ecosystems Project Herpetology Final Report.
- Lumbholtz, Carl.  
1990 *New Trails in Mexico: An Account of One Year's Exploration in North-Western Sonora, Mexico, and South-Western Arizona, 1909-1910*. New York: Charles Scribner's Sons, 1912. Reprinted in 1990, Tucson: University of Arizona Press.
- Mallouf, Michael G.  
1980 "An Archeological Survey of the Ajo crest, Organ Pipe Cactus National Monument, Southwestern Arizona." Tucson, Arizona: Western Archeological and Conservation Center, National Park Service.
- Martinez, Oscar J.  
1988 *Troublesome Border*. Tucson: University of Arizona Press.
- McGee, W. J.  
1901 "The Old Yuma Trail." *National Geographic Magazine* 12(3 and 4, March and April 1901):103-107 and 129-143.

## *Appendixes and Bibliography*

McQuarry, Marisue.

- 1988 "Ha:sa:n Baihidach Masad [July]: Month of the Saguaro Crop." *Native Peoples: The Journal of the Heard Museum* (Summer 1988):18-23.

Metropolitan Tucson Convention and Visitors Bureau

- 1992 "Metro Tucson Visitor Study." Behavior Research Center, Inc. Phoenix, Arizona.

Nabhan, Gary Paul.

- 1986 "Papago Indian Desert Agriculture and Water Control in the Sonoran Desert, 1697-1934." *Applied Geography* (6):43-59.
- 1986 "'Ak-cin `Arroyo Mouth'and the Environmental Setting of the Papago Indian Fields in the Sonoran Desert." *Applied Geography* (6):61-75.
- 1987a *The Desert Smells Like Rain: A Naturalist in Papago Indian Country.* San Francisco: North Point Press.
- 1987b *Gathering the Desert.* Tucson: University of Arizona, 1985. Third printing, 1987b.

Nabhan, Gary Paul, Amadeo M. Rea, Karen L. Reichhardt, Eric Mellink, and Charles F. Hutchinson.

- 1982 "Papago Influences on Habitat and Biotic Diversity: Quitovac Oasis Ethnoecology." *Ethnobiology* 2(2, December 1982):124-143.

National Park Service, U. S. Department of the Interior

- 1970 "The Economic Impact of Organ Pipe Cactus National Monument", by G. F. Leming, J. M. Broer, N. Gennaro, and M. Jarnagin, Division of Economic and Business Research, College of Business and Public Administration, University of Arizona, Tucson, Arizona.
- 1977 Protection of Wetland Guidelines.
- 1988 "Land Use Trends Surrounding Organ Pipe Cactus National Monument." Contract No. CX8000-7-0031. By F. B. Brown and H. L. Payne. Prepared for National Park Service, Western Region, San Francisco, CA.
- 1988 Management Policies.
- 1990 "The Money Generation Model." Office of Social Science, Socio-economic Studies Division, Denver, CO.
- 1990 "Report on the 1989 Visitor Use Survey, Organ Pipe Cactus National Monument", Denver Service Center, Western Team Branch of Planning.
- 1992 Water Resources Management Plan, Organ Pipe Cactus National Monument, Arizona. 139 pp.
- 1993 Floodplain Management Guideline. 14pp.

Negri, Sam.

- 1989 "The Back Roads of Organ Pipe." *Arizona Highways* 65(Number 3, March 1989):22-31.

Ortiz, Alfonso.

- 1979 "Prehistory: Southern Periphery." In *Handbook of North American Indians: Volume 9, Southwest*. William C. Sturtevant, general editor; Alfonso Ortiz, volume editor. Pages 152-161. Washington, District of Columbia: Smithsonian Institution.

Petryszyn, Y.

1991. Update of the Checklist of Mammals, Amphibians and Reptiles of Organ Pipe Cactus National Monument. Unpublished data.

- Pima Association of Governments  
1993 "Population Handbook 1992." Prepared in Cooperation with the Arizona Department of Transportation. July 1993.
- Pima County Development Services Department  
1992 *Pima County Comprehensive Plan*. Planning Division, Comprehensive Plan Section, Tucson, Arizona.
- Pinkava, D. J., M. A. Baker, R. A. Johnson, N. Trushell, G. A. Ruffner, R. S. Felger, and R. K. Van Devender  
1991 "Additions, Notes and Chromosome Numbers for the Flora of Journal of Vascular Plants of Organ Pipe Cactus National Monument, Arizona." *Journal of Arizona-Nevada Academy of Science*.
- Public Law 88-577.  
1964 The Wilderness Act of 1964. 88th Congress, S. 4. September 3, 1964
- Rabb, David D. and Clement K. Chase.  
1987 "History of Mineral Processing in Arizona." In *History of Mining in Arizona*. Edited by J. Michael Canty and Michael N. Greeley. Tucson, Arizona: Mining Club of the Southwest Foundation in conjunction with the Tucson Section of the American Institute of Mining Engineers and the Southwestern Minerals Exploration Association.
- Rankin, Adrienne G.  
1989 "Archeological Survey at Organ Pipe Cactus National Monument Progress Report for 1989." Tucson, Arizona: Western Archeological and Conservation Center, National Park Service.  
1991 "Archeological Survey in Organ Pipe Cactus National Monument: 1991 Progress Report." Tucson, Arizona: Western Archeological and Conservation Center, National Park Service, September 25, 1991.  
1992 Archeological Survey at Organ Pipe Cactus National Monument, Southwestern Arizona, 1989-1991. Tucson, Arizona: Western Archeological and Conservation Center, National Park Service, Publications in Anthropology, Number 61.  
1994 "Between the Desert and the Sea: Archeological Research at Organ Pipe Cactus National Monument." *Bajada* 2(2, April 1994):6-7, The Journal of the National Biological Survey, Cooperative Park Studies Unit, University of Arizona.
- Rice, Glen and Charles Redman.  
1993 "Platform Mounds of the Arizona Desert: An Experiment in Organizational Complexity." In special issue, *Prehistory of the Southwest*. Edited by Catherine M. Cameron. *Expedition, The University Museum Magazine of Archaeology and Anthropology, University of Pennsylvania* 35(1):53-63.
- Rogers, Malcolm  
1939 *Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas*. San Diego Museum Papers No 3, San Diego.  
1958 "San Dieguito Implements from the Terraces of the Rincon-Pantano and Rillito Drainage System." *Kiva* 24:1-23.
- Rosen, P. C., and C. H. Lowe  
1994 "Highway Mortality of Snakes in the Sonoran Desert of Southern Arizona." *Biological Conservation* 68:143-148.
- Simmons, H. L.  
1965 The geology of the Cabeza Prieta Game Range. Unpublished Master's Thesis, Organ Pipe Cactus National Monument, Ajo, Arizona. 56pp.
- Smillie, Gary M.  
1991 Trip Report for Travel to Organ Pipe Cactus National Monument, April 8-10, 1991. 2pp.

## Appendixes and Bibliography

Southwest Parks and Monuments Association

- 1985 A checklist of mammals, amphibians and reptiles of Organ Pipe Cactus National Monument.

Steffens, Ron

- 1994 "Bridging the Border: As NAFTA Goes into Effect, United States and Mexican Officials Must Ensure that Economics Does Not Overshadow the Need to Protect Parks and Other Public Lands." *National Parks Magazine* 68(7-8, July-August 1994):36-41.

Stolzenburg, William

- 1992 "Sacred Peaks, Common Grounds: American Indians and Conservationists Meet at a Cultural Crossroads." *Nature Conservancy* 42(5, September-October 1992):16-23.

Thomas, Robert K.

- 1963 "Papago Land Use, West of the Papago Indian Reservation, South of the Gila River, and the Problem of Sand Papago Identity: Interviews." Unpublished manuscript. Ithaca, New York: 1963. Typescript on file, Organ Pipe Cactus National Monument, Ajo, Arizona, and Western Archeological and Conservation Center, National Park Service, Tucson, Arizona.

Tucson Metropolitan Chamber of Commerce

- 1990 "Tucson at a Glance." Greater Tucson Economic Council.

Underhill, Ruth M.

- 1969 *Papa Indian Religion*. New York: AMS Press. First published New York: Columbia University Press, 1946.

United States Bureau of Indian Affairs, United States Department of the Interior

- 1979 *The Papago and Pima Indians of Arizona*. Palmer Lake, Colorado: The Filter Press. First published as *The Papago Indians of Arizona and their Relatives The Pima*, Washington, District of Columbia: Bureau of Indian Affairs, United States Department of the Interior, 1941.

Vesilind, Priit J.

- 1994 Photographs by Jonna B. Pinneo. "The Sonoran Desert." *National Geographic* 186(3, September 1994):37-63.

Wagoner, Jay J.

- 1952 *History of the Cattle Industry in Southern Arizona, 1540-1940*. Tucson: University of Arizona Press, 1952. Reprinted from *Social Science Bulletin* Number 20, University of Arizona Bulletins 23(2, April 1952):1-132.

Walker, Henry P. and Don Bufkin.

- 1986 *Historical Atlas of Arizona*. Second edition. Norman: University of Oklahoma Press. First published in 1979.

Warren, Claude N.

- 1967 "The San Dieguito Complex: A Review and Hypothesis." *American Antiquity* 32(2):168-185.

Warren, P. L., B. K. Mortenson, B. D. Treadwell, J. E. Bowers, and K. L. Reichardt

- 1981 *Vegetation of Organ Pipe Cactus National Monument*. Cooperative National Park Resources Studies Unit Technical Report Number 8. University of Arizona, Tucson. 79pp.

Western Pima County Town Hall

- 1992 "WPC 2000" Ajo, Arizona.

Wilson, Caroline C.

- 1989 *Sierra del Pinacate, Pinacate Protected Zone, Sonora, Mexico*. Tucson, Arizona: Waller Printing for Friends of Pronatura.

Wilson, E. D., R. T. Moore, and R. T. O'Haire

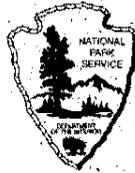
- 1960 *Geologic Map of Pima and Santa Cruz Counties, Arizona*. Arizona Bureau of Mines, University of Arizona, Tucson. 1 map.

Yuma County Chamber of Commerce

1994 "1994 Visitors Guide." Yuma County Chamber of Commerce, Yuma, Arizona.

Zepeda, Ofelia.

1985 "The Sand Papago Oral History Project." Tucson, Arizona: National Park Service, Western Archeological and Conservation Center.



As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.