Final
General Management Plan
Environmental Impact Statement

CARLSBAD CAVERNS
National Park
Eddy County, New Mexico

This Final General Management Plan / Environmental Impact Statement presents and analyzes three alternatives, including the proposed action, for a general management plan for Carlsbad Caverns National Park. The purpose of the plan is to set forth the basic management philosophy and to provide the strategies for addressing issues and achieving management objectives over the next 10 to 15 years. Alternative 1 describes the continuation of the existing management direction at the park, as described in current plans (the no-action alternative). The park would provide for visitor use and respond to resource management issues and concerns as funding allowed, but there would be no major change in management direction. Alternative 2 is the proposed plan and would base resource management and visitor use decisions on scientific research, inventory, and monitoring. Data would be gathered about how human activities and facilities are affecting park resources, especially cavern resources. A development concept plan would be undertaken once these studies had been completed to determine how to reduce or eliminate threats to subsurface resources, with measures possibly ranging from infrastructure improvements to the removal of certain facilities above Carlsbad Cavern. Opportunities for visitors to enjoy and learn about significant park resources would be increased, special off-trail tours would be continued, the feasibility of opening Ogle Cave to tours would be studied, and additional surface trails would be provided. The visitor center would be remodeled to be more efficient, and a ranger residence would be provided near Slaughter Canyon. Alternative 3 proposes the removal of many surface functions and facilities above the cavern within five years to ensure the protection of subsurface resources. To replace these functions, a new visitor orientation/transit center and an NPS operations center would be developed at the base of the escarpment. Visitors would use a shuttle system for access to the existing visitor center, which would be modified to focus on interpretation and essential services. Visitor use of the cavern would be monitored and restricted to minimize further damage to cavern resources, and no special off-trail tours would be provided. The environmental impact analysis indicates that alternatives 2 and 3 would better protect the park’s significant resources than would alternative 1. Some potential threats to subsurface resources would remain under alternative 2, pending the completion of studies. Alternative 2 would increase visitor opportunities and provide more in-depth interpretation, while alternative 3 would limit the range of opportunities but improve interpretation. Alternatives 2 and 3 would both have beneficial long-term socioeconomic impacts. The risk of an accident that could close the cavern to public entry, thus affecting the local tourism industry, would continue over the long term under alternative 1 and over the short term under alternative 2; this risk would be reduced within the foreseeable future under alternative 3.

The Draft General Management Plan / Environmental Impact Statement was on public review from November 15, 1995 to March 25, 1996. A public open house was held February 15, 1996, in Carlsbad, New Mexico. A total of 29 written comments were received and are included in this final document; all substantive comments have been responded to. All oral and written comments were considered during the preparation of the Final General Management Plan / Environmental Impact Statement, in accordance with the requirements of 40 CFR 1503. A record of decision on the final plan will be issued 30 days after this final document has been made available for public review, as announced in the Federal Register. For further information about this plan contact the superintendent, Carlsbad Caverns National Park, 3225 National Parks Highway, Carlsbad, New Mexico 88220; telephone (505) 785-2232, ext. 321.
The purpose of a general management plan for Carlsbad Caverns National Park is to set forth a basic management philosophy and provide strategies for addressing issues and achieving management objectives. It will provide the framework for management decisions over the next 10 to 15 years to meet the following purposes of the park:

- Preserve and protect cave resources, the Chihuahuan Desert ecosystem, and the Capitan Reef in Carlsbad Caverns National Park, as well as associated natural and cultural resources.
- Provide a range of opportunities for public use, enjoyment, and understanding, while minimizing impacts on park resources and natural processes.
- Facilitate research to provide a continuum of information in support of park interpretation and management decisions, and the general body of scientific knowledge.

ALTERNATIVES

This Final General Management Plan/Environmental Impact Statement presents and evaluates three alternatives.

Alternative 1 describes the continuation of the existing management direction at Carlsbad Caverns National Park. It is also referred to as the no-action alternative and is based primarily on continuing the courses of action described in the park's 1992 Statement for Management and in approved park plans, such as the 1994 Resources Management Plan and the 1995 Cave Management Plan.

Under this alternative the National Park Service would continue to maintain Carlsbad Caverns National Park, providing for visitor use and responding to resource management issues and concerns as funding allowed, but no major change in management direction would be initiated. Some infrastructure, such as roads and utilities, would be replaced or upgraded, and the visitor center concession operations would be modified to improve efficiency and consistency with park interpretive themes. For the purposes of this document, it is assumed that new actions would not be taken if ongoing research indicated that Carlsbad Cavern was being threatened by human activities or facilities on the surface. (NPS Management Policies do require, however, that corrective action be taken whenever significant park resources are threatened.)

Alternative 2 is the proposed plan, and the management direction for the next 10 to 15 years would be to base decisions on expanded scientific research, inventory, and monitoring, with particular emphasis on collecting information about how human activities and facilities are affecting park resources and especially cave resources. Once gathered, the information would be used to develop ways to reduce or eliminate damage to resources. Actions to protect Carlsbad Cavern from surface facilities and activities could range from technological measures to the removal of certain facilities from above the cavern; these actions would be described and evaluated in a future development concept plan, which would be prepared with public input. The National Park Service would also take numerous actions to better understand and protect Lechuguilla Cave, other backcountry caves, surface natural resources, and cultural and paleontological resources.

The proposed action would provide visitors with diverse opportunities to enjoy and learn about significant park resources. The feasibility of opening Ogle Cave to guided tours would be studied. Additional surface trails would be provided, along with expanded interpretive programs and information. The existing visitor center would be changed to improve visitors'
SUMMARY

Experiences as well as to make operations more efficient. In addition, certain existing infrastructure would be improved, and a ranger residence would be provided near Slaughter Canyon to improve backcountry management.

Alternative 3 would take immediate and comprehensive measures to reduce or eliminate threats from surface facilities and activities to cave resources. Rather than waiting for further scientific evidence to be collected, the National Park Service would give cave resources the benefit of the doubt; many surface functions and facilities above the cavern would be removed within five years. A new NPS operations center and an orientation/transit center would be provided off the escarpment, a shuttle system would transport visitors to a modified visitor center on the escarpment, and a cave tour reservation system (with capability for making reservations offsite) would be implemented. Visitor use of the cavern would be monitored and restricted to minimize further damage to cave resources. No special off-trail cave tours would be provided. Many other actions in alternative 3 would be similar to those in alternative 2.

ENVIRONMENTAL CONSEQUENCES

The potential consequences of the three alternatives on cave resources, surface natural resources, cultural and paleontological resources, the visitor experience, and socioeconomic impacts have been evaluated. In general, alternatives 2 and 3 would better protect the park's significant resources than would continuing the existing management direction (alternative 1). However, because the proposed action would defer some resource protection actions in order to establish a scientific basis for decision-making, some potential resource threats that would be eliminated in alternative 3 would remain over the short term under the proposed action.

Alternative 1 would maintain the existing visitor experience. The proposed action would improve it by expanding orientation and interpretation, and by providing more diverse visitor opportunities. Alternative 3 would have mixed effects; it would provide better orientation and interpretation, but it would limit opportunities available to visitors.

The proposed action and alternative 3 would have more beneficial long-term socioeconomic impacts than would alternative 1. The risk of an accident that could close the cave to public entry and have major harmful impacts on the tourism industry would continue over the long term under alternative 1, and over the short term under alternative 2. This risk would be reduced within the foreseeable future under alternative 3.

PUBLIC REVIEW OF THE DRAFT

The Draft General Management Plan / Environmental Impact Statement was on public review from November 15, 1995 to March 25, 1996. A public open house was held February 15, 1996, in Carlsbad, New Mexico, to receive comments; 22 people attended. A total of 29 written comments were received and are included in this final document; all substantive comments have been responded to, and changes have been made where appropriate.
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INTRODUCTION

This Final General Management Plan / Environmental Impact Statement presents and analyzes three alternatives for a general management plan for Carlsbad Caverns National Park. The purpose of the plan is to set forth the basic management philosophy and to provide the strategies for addressing issues, achieving management objectives, and guiding decisions for the next 10 to 15 years in order to meet the stated purposes of the park.

A general management plan is needed because the park’s Master Plan is over 20 years old and inadequate for guiding management decisions. The outdated Master Plan assumes joint administration of the park with nearby Guadalupe Mountains National Park, which is now administered separately. That plan also does not reflect current NPS management policies or address current park management issues. Without a general management plan, there is no clear management philosophy or park-specific guidance for resource management, visitor services, park operations, or development. A general management plan is needed to provide specific guidance to ensure that management decisions are consistent with the purposes of the park.

LEGISLATIVE HISTORY

Carlsbad Caverns National Park officially began with the establishment of Carlsbad Cave National Monument by presidential proclamation in 1923. The name was changed to Carlsbad Caverns National Park and the boundaries were enlarged in 1930 by Congress. The park was further enlarged in 1933 and again in 1939 by presidential proclamations. In 1963 a subsequent act made other boundary adjustments and authorized the addition of the Rattlesnake Springs area, which had been acquired in 1934 for supplying domestic water to the park (see appendix A).

A BRIEF DESCRIPTION OF THE PARK

Carlsbad Caverns National Park is in southeastern New Mexico, about 20 miles southwest of Carlsbad, New Mexico, and 150 miles east of El Paso, Texas, and Juarez City, Mexico (see the Region map). Other major metropolitan areas within a day’s drive of the park include Albuquerque and Santa Fe, New Mexico, and Amarillo, Texas.

The park contains 46,766 acres in two separate units. The main unit extends for about 21 miles southwestward along the Capitan Reef. It varies in width from about 3 to 6 miles. The cavern that gives the park its name and most park development are in the eastern portion of this unit, on top of the reef or escarpment. Stretching for miles to the west is the backcountry, which includes the escarpment and several deeply cut and spectacular canyons. The separate Rattlesnake Springs unit contains about 80 acres and lies 7 miles southwest of the park entrance. Rattlesnake Springs is the source of the park’s water supply. Elevations within the park rise from 3,596 feet in the lowlands to 6,368 feet on the escarpment. About 71% of the park (33,125 acres) has been designated as wilderness because of outstanding opportunities for solitude and primitive recreation. These lands are managed according to the provisions of the Wilderness Act and NPS policies on wilderness.

Visitors arrive by way of U.S. Highway 62/180 and enter the park at its far east end near Whites City, at the bottom of the Guadalupe escarpment (see the Vicinity map). They then travel westward along the scenic 7-mile entrance road to the visitor center/cavern entrance area on top of the escarpment. Most visitors arrive in private vehicles, but some visit with school groups or bus tours.
PURPOSE OF AND NEED FOR THE PLAN

DIRECTION FOR THE PLAN

The management of Carlsbad Caverns National Park will be guided by statements defining the park’s purpose and significance. The visitor experience will be guided by interpretive and educational programs, which will be based on the park’s primary interpretive themes.

Park Purpose

The purposes of Carlsbad Caverns National Park are the reasons the area was established and set aside as a unit of the national park system. Purpose statements represent commonly held beliefs grounded in the legislation that established the park, the related legislative history, and subsequent supporting documentation. The following purpose statements provide the foundation for determining what is appropriate in the park.

• Preserve and protect cave resources, the Chihuahuan Desert ecosystem, and the Capitan Reef in Carlsbad Caverns National Park, as well as associated natural and cultural resources.

• Provide a range of opportunities for public use, enjoyment, and understanding, while minimizing impacts on park resources and natural processes.

• Facilitate research to provide a continuum of information in support of park interpretation and management decisions, and the general body of scientific knowledge.

Park Significance

The significance statements for Carlsbad Caverns National Park explain why the park is important to our natural and cultural heritage. They identify the resources and values that must be preserved to accomplish the park’s purposes. Together with the purpose statements, the significance statements establish the foundation for this general management plan’s recommendations for how the park should be managed and used.

• Carlsbad Caverns National Park, a world heritage site, contains large caves of world-class importance that have beautiful and diverse speleothems (cave formations); the Big Room in Carlsbad Cavern is the largest, most easily accessible chamber in North America.

• Lechuguilla Cave is the deepest and third longest limestone cave in the United States; it contains speleothems and microbes found nowhere else in the world.

• Carlsbad Caverns National Park preserves a portion of the Capitan Reef — one of the best preserved, exposed Permian-age fossil reefs in the world. The park’s caves and canyons provide visitors with unique opportunities to view this reef from the inside.

• Capitan Reef has exceptional potential for additional cave discovery, exploration, and research.

• The park contains one of the few protected portions of the northern Chihuahuan Desert ecosystem.

• Carlsbad Cavern has a world-famous colony of migratory Mexican free-tailed bats.

• Many species of plants and animals in the park are at the limits of their geographic distribution, including the northernmost and one of the largest colonies of migratory cave swallows in the United States.

• Guadalupe Mountain caves, including those in the park, collectively contain one of the continent’s most diverse and undisturbed assemblages of extinct Pleistocene-age fauna.

• The park’s cultural resources represent a long and varied continuum of human use starting in prehistoric times and illustrating many adaptations to this desert environment.
Capitan Reef provides extraordinary scenic vistas, both from the top of the escarpment and from the rugged canyons below; the quality of these vistas depends on excellent air quality.

Primary Interpretive Themes

The primary interpretive themes are ideas and messages about Carlsbad Caverns National Park that the National Park Service would like every visitor to understand. These themes are the foundation for park interpretive programs and the visitor experience. The themes do not include everything the park interprets, but they do cover those ideas that are critical to a visitor’s understanding of the park’s significance. All interpretive media and personal services should relate to one or more of the themes, and each theme should be addressed by some part of the overall interpretive program.

- Water, geologic forces, climatic changes, and time have produced and changed the spectacular caves and fossil reef of the Carlsbad region — a process that continues to the present day.

- Caves contain fragile environments that are affected by human activities and natural conditions both underground and on the surface.

- The recent discovery of the extent of Lechuguilla Cave, along with continuing discoveries in other caves in the park, adds immense potential for scientific research.

- The survival of the park’s large bat populations, which in some cases cross international borders, depends on our better understanding of their value, fragility, and place in the ecosystem.

- The Chihuahuan Desert reveals, upon closer examination, complex natural processes that yield an astounding abundance and diversity of plant and animal life.

- Human activities in the region, including prehistoric and historic American Indian occupations, European exploration and settlement, industrial exploitation, commercial development, and tourism have each left reminders of their presence, and each has contributed to the rich history of the area.

- The condition of underground and surface resources, as revealed by continuing research in the park, can serve as an indicator of the overall environmental health of the region and, perhaps, the planet.

A SUMMARY OF PUBLIC INVOLVEMENT

The current general management planning effort began in January 1993, when the public was asked by means of a newsletter to review the proposal for the scope of the plan, to offer additions or deletions, and to voice opinions regarding preliminary issues and opportunities for park management. A similar process was followed with park staff. At the same time the planning team worked to articulate the purpose and significance of the park and park interpretive themes to ensure that the framework for the planning effort was in place.

After public and park staff input were reviewed, a range of five preliminary alternatives was formulated. These alternatives were based on the park purpose and significance statements and addressed issues and concerns raised earlier. A second newsletter in June 1993 presented these preliminary alternatives to the public. Public meetings to gather input on the preliminary alternatives were held in the city of Carlsbad, as were meetings with representatives of various state and federal agencies.

As a result of public comment and additional analysis, two of the original five alternatives were
dropped from further consideration, the remaining alternatives were refined, and the environmental impacts were analyzed. The Draft General Management Plan / Environmental Impact Statement was initially on public review from November 15, 1995, to January 16, 1996; the comment period was subsequently extended to March 25 to provide ample opportunity for agencies, organizations, and individuals to comment.

A public open house was held February 15, 1996, in Carlsbad, New Mexico, to give individuals an opportunity to discuss the alternatives being considered, as well as their concerns. Public comments from the meeting are summarized in the “Consultation and Coordination” section of this document. A total of 29 written comments were received from governmental agencies, organizations, and individuals; these letters, along with responses to substantive comments, are printed beginning on page 165.

As a result of public comments, the alternatives and the impact analysis were further refined. The Final General Management Plan / Environmental Impact Statement will be available for public review for a minimum of 30 days, after which a record of decision will be issued for the general management plan.
PLANNING ISSUES AND CONCERNS TO BE ADDRESSED BY THE PLAN

The following list of problems and issues that are addressed in this document relate to conditions that are adversely affecting, or have the potential to affect, natural and cultural resources, visitor use, land protection, and park operations. Many of the issues relate to what is happening outside the park and the possible effects on park resources. Because the national park was established primarily to protect cave resources, cave protection issues are presented first.

Subsurface Natural Resources

Infiltration of Contaminants and Cave Resources. Cave resources could be affected by the infiltration of contaminants from surface development. The park’s maintenance area, where paint, propane, gas, oil, epoxy, and other chemicals are stored, is just uphill from the natural entrance to the cavern. A spill or fire in this area could result in chemicals or chemical-laden water draining directly into the cavern (see the Cavern Area Surface Drainage map).

Other facilities above the cavern include the visitor center, offices, housing, and associated sewerlines, along with parking lots that collect petroleum products from cars and buses. Contaminants can be transported by air currents and water into the cave environment, potentially causing changes in cave formation processes or putting peoples’ health at risk. Sewerlines above the cavern are more than 60 years old, and breaks have occurred in the past; a leak in sewerlines from the visitor center or the park housing area could result in sewage entering the cavern. Petroleum products washed from parking lots during rainstorms could be draining into the cave and potentially adversely affecting cave resources.

The National Park Service does not fully know where water enters the cave from the surface, how infiltration may have been changed by existing development, or whether some contaminants like petroleum products infiltrate differently than other contaminants. Cave formations that were active in the recent past are no longer active, and vice-versa, suggesting that infiltration patterns have changed.

Oil, Gas, and Mineral Development. Several caves outside the park on U.S. Forest Service (USFS) and Bureau of Land Management (BLM) lands are potentially connected to pristine park caves such as Lechuguilla and possibly other undiscovered caves. Also, many water sources that are integral to the formation of park caves originate outside the park boundary. Management actions by the U.S. Forest Service and provisions in the BLM’s Dark Canyon Environmental Impact Statement, as well as the Lechuguilla Cave Protection Act, provide protection for many cave resources. Currently oil and gas are extracted on state lands, and exploration and extraction take place on private lands near the park; activities on state and private lands are not subject to federal protective restrictions. There is potential for unrestricted activities to irretrievably destroy or alter cave resources in the park.

Carlsbad Cavern. The cavern is being visited by more than 500,000 visitors a year. Gum, food, litter, and lint have been found throughout the cavern, including areas closed to visitors as well as areas quite a distance from the established trail. Several years of monitoring cave formations has shown that as many as 2,000 speleothems annually have been vandalized or stolen. Lights in the cavern have created an environment allowing for alga, moss, and fungus growth. Electric lights have also drawn animals farther into the cave than they would normally venture, resulting in changes to the cave environment.
Lechuguilla Cave. Entry to Lechuguilla Cave is permitted only for exploration and mapping, research, management-related needs, and photography limited to management purposes. However, exploration and research have resulted in some adverse impacts to pristine cave resources.

Access to Lechuguilla Cave is by way of an airlock/culvert system. Currently it is not possible to exit the culvert tunnel if the lid is locked; anyone who is in the cave when the lid is locked could be trapped inside until the lid is opened from outside. Also, when the lid is opened, air blasts through the opening, pelting anyone entering or leaving the cave with small dirt and debris particles and possibly affecting cave air conditions. After rains, rocks and boulders sometimes roll down onto the culvert lid, and occasionally materials collapse at the bottom, below the culvert.

The difficult and lengthy access to the cave necessitates multiday expeditions to explore and precisely document new areas. However, exploration and recording expeditions and careless travel have damaged numerous formations. Mud and dirt cover many delicate and once pristine formations adjacent to travel routes. Human urine may be having unknown effects.

Backcountry Caves. Currently 84 caves are known in the park's backcountry, but staffing is not adequate to fully protect resources or ensure visitor safety. The National Park Service does not know how often the caves are being visited, but there is some evidence of vandalism and theft of cave resources. Cave resources in the backcountry are not being fully monitored.

Surface Natural Resources

Existing baseline inventories contain limited information on the subtle aspects of the desert ecosystem. Most research efforts are focused on collecting information to solve known resource problems, rather than on anticipating or defining new problems.

The illegal collection of rare reptiles, cactus, and fossil rocks has become a concern.

The coarse, round gravel placed on the Walnut Canyon desert drive in the 1980s has spread outside the roadbed into undisturbed areas, adversely affecting plants and wildlife. Dust raised by vehicles frequently becomes quite thick, degrading air quality in the area.

Nonnative Animals. Barbary sheep (Aoudad), which are not native to the area, are aggressive grazers and graze very close to the ground, effectively killing native plant species and promoting nonnative species. This destroys habitat for mule deer, bighorn sheep, and other wildlife. Barbary sheep range in and out of the park and are managed under different policies, depending on where they are found. The Park Service would like to remove Barbary sheep from park lands and reintroduce bighorn sheep.

Backcountry Use / Wilderness. The existing Guadalupe Ridge trail is a primitive road within the park. It provides the only vehicular access to the vicinity of Lechuguilla Cave, which is within wilderness. The road corridor is excluded from wilderness, but the road has not been surveyed. If the road remains unsurveyed, there could be gradual movement of the road where it meanders away from Lowe Ranch and near the Lechuguilla Cave parking area. Any shift in the road location could encroach on adjacent wilderness.

The 57-mile backcountry trail system is in poor condition due to erosion and infrequent maintenance. Some trail segments are difficult to follow.

Domestic Water Resources. The 80-acre Rattlesnake Springs unit contains the park's only domestic water source. The park's water supply could potentially be contaminated by a gas storage plant on nearby private lands, and by irrigation runoff from adjacent agricultural activities.
Cavern Area
Surface Drainage
Cavern Entrance Area
Carlsbad Caverns National Park
United States Department of the Interior
National Park Service
ON MICROFILM

Important major drainage
Sheet flow
Culvert
Ridgeline
Paved road
Unpaved road
Trail
Walkway
Structure or feature
Cavern (subsurface)
Cultural and Paleontological Resources

Baseline Data. Information about archeological resources is incomplete; no comprehensive surveys have been conducted, making it difficult to determine the full significance of these resources or to properly manage them. Past surveys and site records are inadequate and sometimes inaccurate. Human impacts and natural deterioration are believed to be adversely affecting the park's cultural resources.

Paleontological Resources. Significant Pleistocene animal remains and Permian-age fossils in park caves are being disturbed by caving activities, particularly during unsupervised attempts to enlarge and stabilize entrances and through the trampling of surface materials. The disturbance of cave stratigraphy and faunal remains compromises integrity and scientific value for both paleontological and archeological research, and contributes to a loss of significant resources.

Little paleontological research has been initiated or funded by the National Park Service. Most is accomplished by outside institutions and individuals who receive NPS research permits. No approved parkwide research design or research program exists for paleontological resources, which has resulted in an uncoordinated program of unrelated efforts by various institutions. Such programs may not be specifically oriented to the park's purpose, significance, or needs; they may be fragmentary; or they may result in resource damage or redundant efforts. Significant scientific data have been removed from the park, and information returned to the park has been sporadic or incomplete.

Visitor Experience

Orientation. Some visitors are inconvenienced by the fact that it is difficult to get advance information to help them plan and enjoy their park visits.

Visitor Center. Outdoor spaces around the visitor center are limited. Many visitors eat from their cars in the parking lots. Visitors are not able to easily reach the edge of the escarpment to enjoy the panoramic views.

Space is not well-utilized within the visitor center. Interpretive space has undergone several major changes since the center's construction. Various rooms have been converted to uses for which they were not designed, resulting in confusing visitor flow patterns. Office, work, and storage space for interpretive staff is very limited, resulting in cramped working conditions. There are also no meeting rooms or areas to take breaks. The cramped and hectic atmosphere affects staff productivity and creativity.

Interpretation. Concerns related to the quality of the interpretive experience at Carlsbad include the amount of resource damage in the cave and how it relates to interpretation, an inadequate explanation of how surface and cave resources are interrelated, the need for education and interpretive outreach programs (including international connections), the effectiveness of cave tours, the lack of interpretation about research activities, and opportunities for onsite interpretation of Lechuguilla Cave. The Rattlesnake Springs area has outstanding natural, historic, and prehistoric values that could be interpreted, although the site is lacking a full evaluation of its natural and cultural significance and its interpretive potential.

Park Facilities and Staff

Putman cabin is used by maintenance personnel in the backcountry. The structure is in poor condition, is difficult to secure, and possibly constitutes a health threat from hantavirus.

Current staffing levels are not sufficient to provide adequate resource protection and visitor services. Working in a cave environment is stressful and requires frequent rotation of staff to avoid burnout. Staff are also stationed outside the
entrance of the cave for fairly long periods in the summer, with very little shaded space for them when orienting visitors. Staff are insufficient for adequately patrolling backcountry areas of the park and for effectively monitoring exploratory trips into Lechuguilla.

Current housing accommodations for NPS employees make it difficult to attract and keep highly qualified employees, particularly seasonals and volunteers. Two dormitories are provided for seasonal housing, but they are considered to be substandard. No housing exists at Slaughter Canyon, which is experiencing increased day and night use. As previously discussed, park housing over the cavern may be adversely affecting subsurface resources. The park currently has 12 three-bedroom housing units, 5 two-bedroom units, 2 one-bedroom units, a six-bunk men’s dorm, and a four-bunk women’s dorm. Some three-bedroom units are occasionally used as dorms. Very little rental housing is available outside the park, and what is available is too expensive for most employees.

The park entrance road has not been resurfaced for over 15 years and is in poor condition.

The buried waterline from Rattlesnake Springs to the cavern entrance area, which was installed in the 1930s, regularly develops leaks. The leaks are hard to find, and large quantities of water are wasted. Physical access to the waterline is difficult because there is no road along it and because it is crossed by fences.

ISSUES NOT ADDRESSED IN THIS PLAN

Underground Concessions

The underground concession operation within the cavern has been the subject of controversy in recent years. The controversy has centered around two questions: (1) is the underground concession operation consistent with the NPS mission and goals; and (2) is the cavern being adversely affected by the underground facilities?

As part of the concession contract renewal begun in 1993 the National Park Service reevaluated the existing concession operation and explored alternative actions. To make an informed decision about the future of the underground lunchroom, mail drop, and retail space, an environmental assessment was prepared to address this issue.

As a result of the environmental assessment, the National Park Service’s long-range goal is to remove all underground concession facilities because the purposes for which the lunchroom facility was established are no longer valid. The lunchroom was originally needed because hiking into and out of the cavern required 8 to 10 hours, and visitors required a place for refreshment; however, the installation of elevators has put visitors within just a few minutes of the surface, and now visits only last between one and three hours. The Park Service also believes that keeping the lunchroom facilities in the midst of the park’s prime resource is not in keeping with the NPS philosophy of protecting and highlighting the cavern’s special resources and character; currently the underground lunchroom facility is the first and last view many visitors have of Carlsbad Cavern.

Negative impacts associated with the lunchroom include food and trash found outside the lunchroom area (including in cave pools), and possibly changes in the numbers and types of insects found in the cavern. The positive effects of removing the lunchroom were deemed to outweigh any negative impacts on the concessioner and individual visitors. A review by a panel of NPS, other government, and private sector employees concurred with this 1993 decision.
Major Boundary Adjustments

Because of the park's long, narrow shape, development and activities (oil/gas exploration and extraction, and predator control) outside park boundaries could adversely affect the quality of wilderness and park resources, including caves. Several proposals to modify park boundaries have been made since the 1920s. Most of them have recommended expanding the park westward along Guadalupe escarpment to the New Mexico/Texas state line (which would connect Carlsbad Caverns to Guadalupe Mountains National Park and would add about 24,000 acres to the park by transferring land currently administered by the U.S. Forest Service and Bureau of Land Management). Proposals have also been made to add a BLM wilderness study area encompassing Mudgetts Cave and Big Manhole Cave to Carlsbad Caverns National Park.

After considering these proposals and consulting with neighboring agencies, the National Park Service has determined that activities and resources are now being adequately managed. However, greater efficiency and protection could be achieved by unifying under one agency the management of the entire Guadalupe escarpment and the outstanding caves found in the Capitan Reef complex. If future changes in land management place these resources at risk, or threaten park resources, the Park Service will reexamine this issue. (See also the section of the proposed action entitled "Minor Boundary Adjustments," page 59).
INTERRELATIONSHIPS WITH OTHER PLANS, PROJECTS, AND ACTS

NPS PLANS AND PROJECTS

Several approved plans prepared by the National Park Service relate to or are referred to in this Final General Management Plan / Environmental Impact Statement. In general these plans are consistent with the direction provided in this document. Pertinent portions of these plans are summarized below. Additional funding and staff are needed to implement some proposals in these plans.

Natural Resources

Subsurface Natural Resources. Some programs for the study and protection of underground resources have already been developed and assessed in the park’s 1994 Resources Management Plan and Environmental Assessment. Additional programs for exploring, surveying, and monitoring cave resources have been outlined in the 1995 Cave Management Plan. The major programs in these plans are summarized below; see the plans themselves for more detailed information.

The Cave Management Plan includes management objectives to preserve and perpetuate natural cave systems while providing opportunities for public education, recreation, and scientific study. As stated in the plan, caves will be classified according to their resources, and regulations will be established for exploration, research, survey, and entry. The plan also specifies that Lechuguilla Cave will remain closed to general public entry because of its hazardous nature, unique resources, research potential, and continuing exploration and survey. The plan zones Lechuguilla Cave according to its resource and hazard characteristics. Certain zones have specific management restrictions, such as closures and rules regarding group size, escorts, and exploration and survey activities.

The Resources Management Plan calls for several actions affecting underground resources in the park, as summarized below:

All caves designated for regulated public access will be inventoried and monitored. A visitor information packet has been developed for wild caves and provides access instructions, a cave map, safety warnings, and regulations. These packets are provided to visitors upon the issuance of a cave use permit. Photo-monitoring will be carried out by park staff in wild caves designated for regulated visitor entry. Photographs will be taken from fixed points to record baseline conditions prior to implementing the wild cave access policy, and periodically thereafter to detect cave alteration or disturbance resulting from visitor use. Approximately six backcountry caves will be gated and monitoring systems established according to priorities identified in the park’s approved Cave Management Plan.

Facts on water infiltration patterns, and how development has affected water migration into Carlsbad Cavern, are needed to better understand and mitigate human-induced changes in the cave ecosystem. A study has been initiated to determine the rates, amounts, and routes of surface water infiltration into the cavern. The study will use water measurement gauges both on the surface and within the cavern, as well as trace element techniques to determine infiltration routes. It will also identify and characterize potential contaminant sources in the vicinity of the cavern and assess possible hazards and cave resource impacts from such contaminants.
To address concerns about the alteration of the natural cave environment due to over 50 years of intensive human use, a rehabilitation program has been started to control further human-caused changes and to restore areas altered by human activity. The Resources Management Plan calls for a survey to learn what protection measures have worked in other caves. Cave restoration actions include (1) removal of alga and moss growth, lint, litter, coins, organic debris, construction materials, and fill, (2) restoration of oxygen levels in cave pools, and (3) repair of damaged speleothems. These activities may unintentionally disrupt natural systems if they are conducted without additional knowledge of biotic organisms in the cave. Restoration activities will be monitored, and post-treatment effects will be documented.

Surface Natural Resources. The Resources Management Plan also proposed the following actions for surface resources:

- Parkwide surveys (including the Rattlesnake Springs unit) of vegetation and wildlife, including threatened or endangered species and their critical habitat, will be conducted. A reptile and amphibian survey has been identified as a high priority because the park’s existing checklist is outdated and no longer accurate. This information will provide a base against which to measure future changes, including those caused by humans.

- Once information has been collected and programs implemented to restore the natural systems in the park, the emphasis of resource management will shift to monitoring resources and processes. The plan also calls for specialized data storage and retrieval systems, such as a database management system and geographic information system (GIS) to allow park staff to better manage and use the scientific information collected.

- The Resources Management Plan recommends the implementation of a 1986 U.S. Fish and Wildlife Service recovery plan for Sneed’s and Lee’s pincushion cacti. In addition, the Resources Management Plan calls for the development of a recovery plan for the endangered Lloyd’s hedgehog cactus and recommends that the park conduct a photo-monitoring program for all threatened or endangered cacti.

- Nonnative plant species in the park would be controlled. Fruit trees and other nonnative landscape plants within the Rattlesnake Springs Historic District, however, would continue to be managed as a cultural landscape (even though other nonnative invasive species in the district would be controlled).

- The park’s migratory colony of Mexican free-tailed bats has undergone a serious decline in the past three to four decades, although their numbers have been increasing more recently. The plan proposes photo monitoring of bat populations to find if there is a relationship between population changes and human activities outside the park, and to preserve the park’s free-tailed bat maternity colony.

- Cave swallows were first recorded nesting at the entrance of Carlsbad Cavern in 1966 and since have increased steadily. The park represents the northern limit of their range. The Resources Management Plan proposes continued monitoring to gain additional information to properly manage cave swallow populations.

- The plan proposes the reintroduction of two indigenous species (Montezuma quail and desert bighorn sheep), followed by monitoring to evaluate the success of reintroduction. Bighorn sheep are also addressed in the Barbary sheep management program (see below). Montezuma quail are indigenous to the park, but have been extirpated, presumably by habitat alteration due to livestock grazing. (The last recorded sighting of quail in the park was in 1943.) Now that vegetation is
recovering from grazing impacts due to fencing along most of the boundary, it is believed suitable quail habitat is again available. The plan also calls for completing a boundary fence around the park to prevent trespass grazing (all but about 10 miles of boundary have been fenced).

A renewed program of monitoring and restoring springs and seeps as feasible to perpetuate natural hydrologic processes is proposed in the plan.

A parkwide monitoring system to determine appropriate levels and other aspects of backcountry use is proposed.

The 1979 *Barbary Sheep Management Program and Environmental Assessment* calls for the reduction of nonnative Barbary sheep in both Carlsbad Caverns and Guadalupe Mountains National Parks. Historically, the Guadalupe Mountains supported populations of desert bighorn sheep, but the last reliable sightings were in 1979. The principal cause of the species’ decline was the introduction of Barbary sheep and domestic sheep and goats on historic bighorn ranges. Reducing the number of Barbary sheep would reduce competition with native wildlife species, primarily mule deer and bighorn sheep. Factors complicating the park’s Barbary sheep management program include the species’ mobility across park boundaries and the fact that the state manages Barbary sheep as a game species.

The *Mountain Lion Management Plan* (NPS 1988) proposes the continued protection of lions within the national park, which requires maintaining suitable range, habitat, and prey species. The plan also proposes a deer and elk monitoring program in the park to provide information on these prey species, and the development of an interagency mountain lion task force to coordinate management efforts.

The park’s *Fire Management Plan* (NPS 1995) guides the prevention, detection, monitoring, and suppression of wild fires and the management of natural and management-ignited prescribed fires. Fire is believed to have a profound influence on the Chihuahuan Desert grassland ecosystem. Fire management issues often extend across park boundaries. To address this concern, a *Draft Fire Management Plan* has also been developed for the Guadalupe Mountains region in cooperation with adjacent federal land management agencies, including the U.S. Forest Service and the Bureau of Land Management. The draft plan details a program of prescribed natural fire and management-ignited prescribed fire in interagency fire management zones.

The *Backcountry / Wilderness Management Plan and Environmental Assessment* (NPS 1991) regulates and directs visitor use and provides for the protection and preservation of backcountry or wilderness values. The plan addresses management of wilderness, backcountry trails, caves, visitor use, fire, wildlife, and the protection of sensitive backcountry natural and cultural resources.

The *Rattlesnake Springs Management Plan* (NPS 1989) calls for the collection of information about the site’s natural resources (such as characteristics of the stream/wetland complex) and cultural resources so that a balanced resource management program can be implemented while maintaining the domestic water system and picnic area at the unit.

The *Water Resources Management Profile* (NPS 1982) provides information on the park’s water resources and strategies for water resource protection. The profile recommends that 100-year flood level elevations be determined, along with the probable maximum floodplain within selected reaches of Walnut Canyon, Slaughter Canyon, and Rattlesnake Springs in order to fully comply with Executive Order 11988, “Floodplain Management.”
Cultural and Paleontological Resources

The Resources Management Plan outlines specific actions for cultural resources, as summarized below.

A comprehensive archeological survey of the entire park (including the evaluation of site age and cultural affiliation, and national register significance) is proposed. This survey will provide an archeological overview and assessment of the park to review, summarize, and evaluate existing archeological and collections data. A complete inventory file of sites and a revised cultural resource base map are recommended as part of a new geographic information system.

Some of the park’s caves and shelters contain pictographs, including what appear to be rare dark zone cave drawings as well as nationally recognized pictographs related to several periods of occupation. Because these archeological resources are poorly understood and lack appropriate documentation or plans for their protection, the Resource Management Plan prescribes an inventory and analysis of the pictographs to learn their age, cultural affiliation, condition, threats, and appropriate preservation techniques.

The protection of archeological sites will be a companion program to the plans described above. Current park programs rely on public education, controlled access, ranger patrols, and not publicizing site locations. Additional information will be developed to provide a consistent management approach to these resources by evaluating potential threats and alternative methods of protection, including ways to mitigate impacts.

Proposed studies to aid in resource management and interpretation include:

- a parkwide historic resource study to document past events and resources related to the park’s archeological and historic sites; to provide information to direct research, identify protection needs, and provide interpretive information; and to complete the park’s cultural landscape inventory and report
- a study of the history of guano mining in the park to help archeologists identify, evaluate, and protect historic cave resources
- a comprehensive report on the area’s general history to synthesize existing information from all sources (oral history, books, letters, etc.), covering such topics as ranching, mining, exploration, park development, and historic and prehistoric occupation of the area

Several studies related to preserving natural resource elements of the cultural landscape are identified in the Resources Management Plan, including management practices for the Rattlesnake Springs unit, the evaluation and restoration of wetlands, and inventories. These studies will provide background for evaluating national register significance, along with accurate information for interpretation and resource management.

Protection plans (including historic structure reports and historic structure preservation guides) will be developed for historic resources. These plans will include cyclic maintenance programs, as well as proposals to protect historic remains in caverns, historic districts, and other historic remains susceptible to theft or vandalism.

Integrating the park’s natural and cultural resources management plans (e.g., cave management, fire management, vegetation management) will ensure consistency in the treatment of resources. Studying the effects of fire on archeological sites is particularly relevant because of the use of prescribed natural fire and management-ignited burns.
in the park. A comprehensive database management/geographic information system will allow natural and cultural resource information to be integrated for evaluating resources and making management decisions, and it will also enhance future research opportunities.

Of the approximately 30,000 objects and specimens in the museum collection, only about 70% are listed in the NPS Automated National Catalog System. The park's large, valuable archival collections, including photographic collections, are not fully accessioned, totally organized for easy use, or completely cataloged to NPS standards. The identification of and accountability for artifacts and records at other institutions are minimal. The Resources Management Plan describes actions needed to bring these collections up to NPS standards, and to complete the following studies: (1) a collection condition survey, (2) a collection management plan to guide the care of museum and archival materials, (3) a collection storage plan to ensure proper conditions for the curation of collections, and (4) an archaeological and ethnographic collections study.

An ethnographic overview and assessment is currently underway and will provide data on traditional resource use among contemporary American Indian and other ethnic groups, as well as help identify concerns.

**Interpretation**

An interpretive plan is being developed in conjunction with the general management plan. The interpretive plan describes the vision for the park's future interpretive program and identifies the media and programs best suited for meeting visitor needs and telling park stories.

**Land Protection**

The park's *Land Protection Plan* (NPS 1984) addresses the issue of the one remaining 340-acre parcel of private land within the southwestern portion of the park. Present authority allows for the acquisition of this land by donation or exchange only. The *Land Protection Plan* recommends that if ongoing efforts to acquire this tract through donation or exchange are unsuccessful, the Park Service will seek legislative authority to acquire it with donated or appropriated funds.

**OTHER FEDERAL PLANS AND ACTS**

In addition to the following plans and acts, see "Regulatory Compliance Actions" (pages 157–60) for laws, guidelines, and policies that must be considered during planning.

The U.S. Forest Service has requested the Bureau of Land Management to withdraw 24,740 acres of land within Lincoln National Forest from mineral lease. Such a withdrawal would protect the Guadalupe escarpment wilderness study area, pending congressional action on several proposals, including one to establish a Guadalupe Caves Natural Geological Area.

**Cave Protection Areas as Defined by the Lechuguilla Cave Protection Act and the Final Dark Canyon Environmental Impact Statement:** The Lechuguilla Cave Protection Act (Public Law 103-169, November 1993; see appendix A) gives additional protection to Lechuguilla Cave and other cave resources in and near Carlsbad Caverns National Park by establishing a 9,720-acre cave protection area (see the Lechuguilla Protection Area/Well Status map). Subject to valid existing rights, the act withdraws 6,280 acres of adjacent federal lands from mineral exploration and development, and it prohibits new drilling. The act, however, does not apply to the 960 acres of adjacent private lands or 2,880 acres of state-owned lands within the cave protection area. Approximately 320 acres of the private lands have a split estate: that is, the
surface is privately owned and the mineral rights are federally owned. Mineral exploration and extraction could continue on about 3,500 acres of state-owned lands and private lands where the federal government does not own the mineral rights.

The BLM's 1993 Final Dark Canyon Environmental Impact Statement establishes an 8,320-acre cave protection area north of the park in the vicinity of Dark Canyon.

These two cave protection areas are similar in many respects. The protective measures provided in the Lechuguilla Cave Protection Act — including stipulating no surface occupancy on existing leases, canceling existing leases where necessary, prohibiting additional drilling, and limiting surface access — should provide adequate protection for cave resources on federal lands. The Park Service believes the protective and mitigative measures prescribed in the Final Dark Canyon Environmental Impact Statement are appropriate and adequate to protect Lechuguilla Cave. However, there is no guarantee that caves would be similarly protected from wells drilled on nonfederal lands inside the cave protection areas.

Federal Cave Resources Protection Act of 1988: The purpose of Federal Cave Resources Protection Act is to secure, protect, and preserve significant caves on federal land for the perpetual use, enjoyment, and benefit of all people, as well as to foster increased cooperation and exchange of cave resource information between governmental agencies. The act requires the National Park Service to inventory all caves under its jurisdiction for computerized mapping access to ecological, geological, and hydrological data.

Wilderness Act of 1964: The Wilderness Act gives Congress the authority to designate public lands as part of the national wilderness preservation system in order to secure wilderness benefits for future generations. The act limits uses on wilderness lands to those that are consistent with wilderness values. Activities in such areas (subject to valid existing rights) protect wilderness from drilling, logging, mechanized transportation, and permanent development, including roads. This act applies to 33,125 acres of wilderness in Carlsbad Caverns National Park.
Lechuguilla Cave Protection Area/Well Status

Carlsbad Caverns National Park

United States Department of the Interior
National Park Service

DSC July 1996 130 20.032A
Hiker on ridge above Slaughter Canyon
INTRODUCTION

This section describes three alternatives, including the proposed action, for the general management plan for Carlsbad Caverns National Park.

• Alternative 1 would continue the existing management direction for the park, and is also referred to as the no-action alternative. This alternative describes existing conditions, draws heavily on existing plans, and represents a baseline for analyzing the impacts of implementing the other alternatives.

• Alternative 2 is the proposed action for the park. It is based on gathering the specific information necessary to determine how human activities and facilities are affecting park resources, particularly caves. Once gathered, the information would be used to address resource threats in a targeted, specific manner.

• Alternative 3 would involve immediate and extensive measures to reduce or eliminate threats to cave resources from human activities and facilities. Within five years many surface facilities above the cavern would be removed, and a new orientation/transportation center would be constructed at the base of the escarpment. A shuttle system would transport visitors to the top of the escarpment. Visitor use in the cavern would be monitored and restricted as necessary to help protect the resources.

Also, in this alternative visitors would be offered more complete interpretation of park resources, and they would have expanded opportunities for experiencing them.

Table 1 at the end of this section summarizes the alternatives, and table 2 summarizes their significant impacts.
ACTIONS COMMON TO ALL ALTERNATIVES

A number of actions supporting the park's stated purpose and significance are proposed in all three alternatives. These common actions are described below and are not repeated in the individual descriptions of the alternatives. These actions are in addition to those described in existing plans (see "Interrelationships to Existing Plans, Projects, and Acts," page 16).

NATURAL RESOURCE MANAGEMENT

Subsurface Resources

The National Park Service will continue to experiment with and study methods to reduce cave resource impacts, including ways to keep people from touching or breaking formations and spreading lint from their clothing. For example, the following methods will be evaluated:

- modifying cave tour methods and sizes
- changing or adding barriers and signs
- relocating trails in limited areas
- increasing NPS ranger presence
- providing lint containment structures along trails
- having visitors wear special garments
- experimenting with trail surface materials and washing techniques
- installing off-trail alarm devices and audio-visual monitoring devices
- developing new modes of visitor education

Cave tour audio messages will also be expanded to encourage responsible behavior in the cave.

Cave resources north of the park boundary are to be protected by the Bureau of Land Management in accordance with regulations for the cave protection areas created by the Lechuguilla Cave Protection Act of 1993 and the BLM's Final Dark Canyon Environmental Impact Statement. The Park Service will cooperate with the bureau in revising the BLM's resource management plan to mitigate current drilling impacts on cave resources.

State and private lands within the Lechuguilla Cave protection area are not covered by federal protective measures. The Park Service will work cooperatively with the state of New Mexico to develop protective measures for state-permitted wells in this area. The Park Service will seek state equivalents to the "no surface occupancy" stipulation, as well as other protective and mitigative measures required on federal leases. The Park Service will encourage the state to adopt as the minimum the same well drilling, casing, monitoring, and plugging requirements as specified for federal leases in the "Record of Decision" for the Final Dark Canyon Environmental Impact Statement (BLM 1994).

The National Park Service will continue to encourage studies to collect data on the faunal and microbial life of the park's caves. This information will increase NPS knowledge and understanding of the caves and help ensure that potential impacts to cave fauna are avoided or minimized.

Surface Resources

Biological, geological, and other natural processes will be permitted to continue with a minimum of human disturbance. However, because park ecosystems have been and will continue to be influenced by human activities, some active manipulation (e.g., prescribed fires, the reintroduction of extirpated species, and the control of exotic species) is necessary to meet the resource management objectives as stated in the park's Statement for Management (NPS 1992a). Several studies and actions needed to manage surface natural resources have already been described in the Resources Management Plan (see page 17).
Air Quality. Section 176 of the Clean Air Act requires all federal agency projects to conform to federal, state, and local air quality regulations geared toward attaining and maintaining national ambient air quality standards (NAAQS) for all major pollutants. Park managers will work cooperatively with Guadalupe Mountains National Park and the Waste Isolation Pilot Project (WIPP) to monitor air quality in the vicinity of the park. Park managers will also work with state and federal regulatory agencies to reduce or eliminate air pollution from regional industrial development that is causing reduced visibility in the park.

Water Resources. The National Park Service will continue to work cooperatively with the state of New Mexico to address water quality issues. An emergency flood response plan for flood-prone areas of the park, particularly Walnut Canyon and Slaughter Canyon, will be updated by park staff.

CULTURAL AND PALEONTOLOGICAL RESOURCE MANAGEMENT

Several studies and actions needed to manage the park’s cultural resources have been described in the park’s Resources Management Plan (see page 19). New studies are being completed as staffing and funding allow (e.g., a list of classified structures, a national catalogue of museum objects, and an ethnographic overview and assessment are currently underway). Laws, guidelines, and policies that must be considered in planning for cultural resources are described in detail in appendix B. The following management actions complement those described in the Resources Management Plan.

Archeological Resources

Previously surveyed areas will be included in comprehensive archeological surveys of the entire park, and data collected during surveys will be added to the park’s geographic information system. As required by law, specific locational and other sensitive information about cultural sites and paleontological resources will not be disclosed to the public.

Routine monitoring of resource conditions and promptly implementing mitigating measures will help reduce impacts of illegal collecting, vandalism, trampling, and the creation of informal trails (and subsequent erosion or changes in site context) due to large numbers of visitors using a small area. If damage is occurring from natural processes, appropriate preservation measures will be promptly initiated.

Ground-disturbing activities (including new construction, grading, filling, revegetation, or removing structures) will avoid sites wherever possible. At the earliest possible stage of a proposed project, site specific investigations will be conducted. If significant cultural resources are present, the Park Service will consult with the New Mexico state historic preservation officer and the Advisory Council on Historic Preservation to ensure the best possible means of resource avoidance, preservation, and mitigation strategies (e.g., archeological monitoring and/or data retrieval).

Where impacts on resources cannot be avoided (e.g., vandalism or erosion), appropriate investigations, documentation, and mitigation will be conducted to recover scientific data and to mitigate adverse effects. Possible mitigation strategies include collecting diagnostic artifacts and material samples, documenting site features, stabilizing surface features, recovering data, and monitoring construction activities. Site protection methods will include visitor use management, interpretive programs, and law enforcement.

Historic Resources

The inventory, evaluation, and management of historic sites and structures will generally be the same as described for archeological sites and as proposed in the Resources Management Plan.
Routine maintenance will help ensure the continued integrity of historic structures and landscapes.

The adaptive use or rehabilitation of historic structures will follow guidelines set out in the Secretary of the Interior’s Standards for Rehabilitation (NPS 1990). In the event that buildings are removed from the Caverns Historic District, a memorandum of understanding will be negotiated among the Park Service, the state historic preservation officer, and the Advisory Council on Historic Preservation.

Because of the unique combination of significant natural and cultural features at Rattlesnake Springs, this unit will be managed as a cultural landscape, with further work to coordinate the preservation of natural and cultural elements. Some actions relating to the management of natural resources are included in the Resources Management Plan. The cultural landscape is described and defined in appendix C, along with recommendations for studies and management actions and a description of integrated management strategies for the unit. The recommended studies comply with the 1984 memorandum of understanding between the National Park Service and the Nature Conservancy, as well as with the National Historic Preservation Act.

Ethnographic Resources

Ethnographic resources are special types of cultural resources that are meaningful for a traditional group. These resources may include places and natural features with religious meaning to Indian tribes affiliated with park lands, plants valued for their healing properties, or places or items of historic importance.

The National Park Service has contracted for an ethnographic overview and assessment. As a result of this study, consultation has been started with American Indian groups regarding areas and issues of concern to them. Information received during this study will also be used to guide planning and management efforts, but will remain confidential.

The protection of ethnographic sites, an important element of all alternatives, will be accomplished through a combination of public education, patrols, and protective devices. The park superintendent also has the option to restrict public access to sacred sites. Wherever possible, nonintrusive archeological investigations will be used in preference to other methods, particularly where valid results could be obtained through other means. In consultation and coordination with affiliated tribes, the park will develop a formal written policy for tribal access for ceremonial and resource collection purposes. The park will develop a memorandum of understanding with affiliated tribes to further describe specific details.

The Ysleta del Sur Pueblo and the Mescalero Apache have expressed an interest in the traditional use of resources within the park. Decisions about traditional use of park resources will be made on a case-by-case basis, in consultation with the tribes culturally affiliated with the park. Such consultation will enable the park to develop ways to accommodate traditional uses without impinging on resource values.

Because the oral traditions of the Zia Pueblo include references to ancestral Zia being in the Carlsbad Cavern area and identify specific sites within the park, this pueblo will be included in present and future consultations regarding park planning and activities. Other tribes, such as the Jicarilla and Chiricahua Apache, the Kiowa, and the Comanche, may also have stories related to the park, and they will be included in future consultations if they wish.

See the “Consultation and Coordination” section (pages 159–60) for further information about Indian tribes affiliated with the park.
Museum Resources

The existing backlog of artifacts, specimens, and samples will be cataloged to Automated National Catalog System standards, and needed studies will be completed as described in the Resources Management Plan.

Collections will be managed in accordance with guidelines for implementing the provisions of the Native American Graves Protection and Repatriation Act of 1990 and the programs described in the Resources Management Plan.

Paleontological Resources

The park will work with paleontologists to identify and inventory paleontological specimens. Protective measures and mitigations described for archeological sites will generally apply to paleontological remains.

VISITOR USE

Regional Information, Orientation, and Access

To ensure that day and overnight visitors to the region receive accurate and up-to-date information about the park, NPS staff will continue to provide training programs for area motel operators, chamber of commerce personnel, and others involved in the region’s tourism industry. In addition, the park will continue to provide park literature to area motels and tourist centers. Educational programs will also be developed for the Internet so that the public can learn about the park’s resources in a nonconsumptive manner. This technology can be used to offer learning opportunities about both traditional visitor use areas and inaccessible parts of caves.

As visitors approach Whites City, signs call attention to the park’s travelers’ information station (TIS) radio broadcasts in English and Spanish. Broadcast information will describe the various guided and self-guided cave tour options, the levels of difficulty of each tour, time commitments, costs, and methods of payment.

Cave Interpretation. The park will continue to charge interpretive fees for guided tours. Fees collected will remain in the park to reimburse the costs of the guided tour programs.

Guided tours of Slaughter Canyon Cave on a reservation basis will continue.

Interpretation on the Surface. Visitors will continue to be able to use existing auto routes to experience the Chihuahuan Desert environment. Although a vehicle tour provides a less intimate experience than walking or hiking, cars make the desert more accessible on hot summer days, and they provide an option for people who are unable to walk even short distances. The park entrance road will be an interpretive experience for people who take the time to stop at roadside pullouts that tell about the desert and related elements of human history. For a more in-depth experience, visitors may also take the 9-mile Walnut Canyon desert drive. The self-guiding nature trail adjacent to the visitor center will continue to serve as a short introduction for visitors to the Chihuahuan Desert environment.

The twilight bat flight interpretive programs at the amphitheater near the natural entrance will continue, with limited interpretation of cave swallows.

Educational Program. The park’s educational program will target school groups planning trips to the park. Teacher workshops will be a key element of proposed programs. Trained teachers will be able to lead tours of the cave and conduct other activities with their students.

Access for Special Populations

Visitors with physical disabilities will still have access to nearly a third of the trails inside Carlsbad Cavern, as well as to an addition to the
nature trail and overlook east of the visitor center, public areas of the visitor center (except the elevator tower observation area), and picnic areas. These facilities provide many opportunities for visitors to experience a representative portion of the park's resources. Some other areas of the park having natural obstacles or relatively steep gradients (such as most of the Chihuahuan Desert nature trail) will remain accessible only with assistance.

Roughly two-thirds of the trails inside Carlsbad Cavern and most of the backcountry trails, including the trails to Slaughter Canyon Cave and Ogle Cave, will remain inaccessible to many visitors with disabilities. Specific recommendations for the use of facilities throughout the park by physically disabled visitors are detailed in the park's *Handicap Access Plan* (NPS 1988a). These recommendations will be considered on a case-by-case basis.

**GENERAL DEVELOPMENT**

Existing roads and trails will remain. The asphalt entrance road will be repaved with federal lands highway program funds. (An assessment by the Federal Highways Administration in the mid-1980s concluded that the road is well designed and engineered, despite the fact that flash floods after intense rainstorms may close the road for as much as eight hours at a time).

The picnic area at Rattlesnake Springs, the only accessible riparian area with shade in the vicinity of the park, will continue to be available to visitors.

The condition of the visitor center elevators into the cavern will be assessed, and they will be upgraded or replaced when necessary. The elevator tower roof will be repaired or replaced as appropriate to fix a condensation/leak problem.

The park's existing water supply system will be replaced. Possible options for replacing the system — including the aged water transmission pipelines connecting the Rattlesnake Springs well to the cavern entrance area, and two large water storage tanks on the escarpment — will be evaluated. Options that might be considered include replacing the pipes in place, and replacing, burying, or moving the existing water storage tanks. These options will be evaluated subject to the National Environmental Policy Act and other resource-specific laws separate from this planning effort.

Criteria for evaluating water system replacement options will include the following:

1) Provide safe, potable water in a cost-effective, energy-efficient, and sustainable manner over the long term.

2) Do not threaten cultural resources within the Rattlesnake Springs Historic District, which has been inventoried as a possible cultural landscape.

3) Ensure replacement options can be reasonably achieved, in compliance with applicable New Mexico water laws.

4) Ensure replacement options can be achieved reasonably and are legal from a landownership perspective.

5) Do not detract from the park's scenic quality.

6) Do not threaten the stream/wetland system and associated natural resources at Rattlesnake Springs, which is an important feeding/resting area for bats, birds, and other wildlife.

7) Do not threaten cave resources.

8) Meet other legal mandates (National Environmental Policy Act, Endangered Species Act, National Historic Preservation Act, etc.) to consider and protect natural and cultural resources.
ALTERNATIVE 1 — CONTINUE EXISTING MANAGEMENT DIRECTION (NO ACTION)

Alternative 1 describes the continuation of existing management direction at Carlsbad Caverns National Park; it is also referred to as the status quo or no-action alternative. This alternative provides a baseline for evaluating the changes and related environmental impacts that would occur under the other alternatives. According to the park’s Statement for Management, current management objectives for the park are as follows:

**Resource Management:** Ensure the protection and long-term perpetuation of the natural and historical conditions and associations of all cave and surface resources.

**Visitor Use:** Create within the public a sense of the value of park resources and the importance of their conservation.

**Facility Management:** Ensure an adequate level of safe, functional, and appropriate public use and management facilities.

**Development:** Ensure that park development is the minimum necessary for park administration and the provision of essential services to park visitors.

Under this alternative the Park Service would continue to maintain Carlsbad Caverns National Park, providing for visitor use and responding to resource management issues and concerns as funding allowed, but no major change in management direction would be initiated. For the purposes of this document, it is assumed that action would not be taken if ongoing research indicated that the cavern was being threatened by surface development.

The following actions are based on the programs described in approved NPS plans (see “Interrelationships with Other Plans, Projects, and Acts,” page 16) and are consistent with the objectives of those plans. See also the preceding section, “Actions Common to All Alternatives.”

NATURAL RESOURCE MANAGEMENT

Subsurface Resources

Programs to study and protect underground resources, as proposed in the Resources Management Plan, would be continued, along with programs to explore, survey, and monitor cave resources as outlined in the Cave Management Plan. Additional funding and staffing are needed to complete these programs.

**Carlsbad Cavern.** To help protect the fragile speleothems in the Green Lake Room, King’s Palace, Queen’s Chamber, and Papoose Room, NPS staff would continue to conduct guided tours of limited size. In the Big Room and the Main Corridor, where most visitors would be on self-guided tours, NPS staff would conduct roving patrols in areas where resources are most susceptible to damage. Guardrails and barriers would be placed to discourage visitors from damaging sensitive areas. Uniformed park staff would give short orientation talks to visitors taking the elevator down to the Big Room and would emphasize the need for visitors to behave in a safe and resource-conscious manner.

**Lechuguilla Cave.** Lechuguilla Cave would be managed as described in existing plans.

Surface Resources

Programs for the study and protection of surface resources that have already been developed and assessed in the Resources Management Plan would be implemented, as would programs...
alternatives, including the proposed action

described in other park plans (see "Interrelationships with Other Plans, Projects, and Acts" and "Actions Common to All Alternatives"). These include programs for wildlife, water resources, and threatened or endangered species. Additional funds and staff are needed to complete these programs.

Cultural and Paleontological Resource Management

Site-specific archeological surveys with a high priority would include the following: areas proposed for pipeline replacement in the Caverns Historic District, the Walnut Canyon desert drive, and areas affected by replacing the park's water supply system. Sites that were threatened by looting or vandalism would also have priority for inventory and evaluation. Archeological resources would be managed as described in existing plans and "Actions Common to All Alternatives."

The identification, evaluation, and management of historic, ethnographic, archival, and paleontological resources would be same as described in existing plans and "Actions Common to All Alternatives."

Visitor Use

Carrying Capacity

Visitor entry into the park would continue to be temporarily halted when the existing parking capacity is reached. Entry into the cavern would be partially regulated by current elevator capacity, and by current limits on the sizes of guided tours.

Regional Information, Orientation, and Access

At the first pullout inside the park entrance, an informational kiosk would continue to offer general information about the park and cave tour information. Visitors would continue to drive to existing parking areas near the visitor center on top of the escarpment.

Carlsbad Cavern Visitor Center

Existing wayside exhibit kiosks near the visitor center would provide cave tour-related information. Visitors could use automated cave tour ticket machines if they wished.

Inside the center visitors could purchase tickets at the sales counters (if they had not used the ticket machines) or go to the information desk in the lobby. Once visitors had their tickets, most would continue to take the elevators down to the Big Room, where rangers orient them to the cavern and talk about the need to protect resources. At peak times visitors would wait their turn to hear the cave orientation talk before taking the elevators into the cavern. Visitors wishing to enter the cave through the natural entrance would leave the visitor center through the east end doors and follow the path to the natural entrance, where they would receive an orientation talk.

The present exhibits in the visitor center would remain, as would the audiovisual theater. The existing exhibit on Lechuguilla Cave would be improved, and the theater would show existing films and videos on Lechuguilla. Wayside exhibits on the observation deck would continue to identify landmarks and illustrate the location of cave resources below the surface.

In general, concession operations in the visitor center would be made more space-efficient. Food service in the visitor center would be converted to fast food, cafeteria style, or a service type adequate to serve large numbers of visitors quickly and efficiently. Merchandise sold in the gift shop would be more reflective of park interpretive themes. The gift shop and kennel services for pets would be retained.
Alternative 1 — Continue Existing Management Direction (No Action)

Interpretation Underground

Visitors would still be able to select from a variety of guided and self-guided tours in Carlsbad Cavern, providing opportunities for all visitors to have informative and enjoyable experiences that would be combined with ways to learn about helping protect resources. Tours of the Big Room and the Main Corridor would continue to be self-guided, with interpreters stationed in sensitive areas to protect cave resources and to be available to talk with visitors. Low-profile wayside exhibits in both English and Spanish would continue to interpret key features, topics, and concepts. Visitors could also use audio tour equipment for more extensive and supplemental information.

The King’s Palace tour portion of the cavern would continue to be accessible by guided tour only, and special off-trail tours would still be offered on a reservation basis, as staffing permitted. Tours would assemble near the lower elevator lobby. An optimal number of visitors for each guided tour would be established, based on the park’s management objectives for protecting resources and for providing a quality visitor experience.

The park would continue charging separate interpretive fees for some or all guided tours. Fees would remain in the park and be used to reimburse the cost of the guided tour programs. There would be no additional charge for the self-guiding tour of the Big Room, which would be included in the basic user fee.

Interpretation on the Surface

A kiosk providing information about Slaughter Canyon Cave tours and the hike to the cave entrance would remain at the Slaughter Canyon trailhead. Limited information about Rattlesnake Springs would continue to be posted in a bulletin case near the Rattlesnake Springs picnic area parking lot.

Educational Program

The educational program would be the same as described in existing plans and the “Actions Common to All Alternatives” section.

GENERAL DEVELOPMENT

Existing functions would be retained in the NPS portion of the visitor center. Interpretive staff working in the temporary building behind the visitor center would be moved into the visitor center when space became available, and the temporary building would be removed.

The park headquarters and maintenance functions would remain in the Caverns Historic District. Administrative offices in the city of Carlsbad would continue to serve the needs of both Carlsbad Caverns and Guadalupe Mountains National Parks. Cave resource management offices would remain in stone structures in the Caverns Historic District, as would workspace for non-NPS cave researchers. The park’s resource collection and curator’s office would remain in the visitor center.

Seasonal employees would continue to live in substandard dormitories in the Caverns Historic District. Permanent employees would remain in historic adobe apartments and in the mid-1960s apartments north of the district.

The aging water- and sewerlines in the Caverns Historic District would be replaced.

PARK OPERATIONS

Park operations would continue as described in existing plans and the park’s Statement for Management.
ALTHERNATIVES, INCLUDING THE PROPOSED ACTION

LAND USE AND MANAGEMENT

The park’s management zones would continue as described in the park’s Statement for Management. Most of the park would be zoned and managed as a natural zone, where the management emphasis would be on the conservation of natural resources and processes, and on the accommodation of uses that do not adversely affect these resources.

A park development zone is designated in the vicinity of Carlsbad Cavern, where the visitor center and other park facilities are located, and another at Rattlesnake Springs, the site of the park’s water supply and visitor picnic area. Development zones indicate areas where park development and intensive use have altered the natural environment.

The Caverns Historic District, Rattlesnake Springs Historic District, Ogle Cave, and one pictograph site would be zoned for cultural resource protection.

PLAN IMPLEMENTATION

Phasing

Alternative 1 would be implemented as funding became available. Priorities for programmatic actions would be as identified in existing plans. High priority development actions would include evaluating and replacing the domestic water system, evaluating the visitor center elevators, and repaving the park entrance road.

Costs

Construction. Construction costs for alternative 1 are estimated to be $9,971,224 (see appendix D for more detailed information).

Staffing. The park currently has 103 full-time employees allocated as follows:

- Management and Administration — 15
- Interpretation and Visitor Services — 46
- Resource Management and Visitor Protection — 11
- Maintenance — 31

The park also has 41 summer and 20 winter seasonal employees. The park’s annual budget for salaries and benefits in 1995 was $3,146,140.
ALTERNATIVE 2 — PROPOSED ACTION

Alternative 2 is the proposed general management plan for Carlsbad Caverns National Park. Under this alternative the management direction for the park for the next 10 to 15 years would be based on scientific research and inventory and monitoring. Information would be gathered to determine how human activities and facilities are affecting park resources, particularly Carlsbad Cavern resources. Once gathered, the information would be used to choose specific ways to reduce or eliminate human-caused damage to resources, including damage to caves from activities and developments on the surface. This alternative would also provide visitors with diverse options for enjoying and learning about significant park resources.

The following actions would complement the programs described in approved NPS plans (see "Interrelationships with Existing Plans, Projects, and Acts"), and they are consistent with the objectives of those plans, except where otherwise noted.

NATURAL RESOURCE MANAGEMENT

Subsurface Resources

The most significant resource in the park is its caves. In accordance with NPS policies and regulations, underground portions of the natural environment would be protected and preserved to ensure ecosystem integrity while providing for visitor enjoyment. Biological, geological, and other natural processes would be permitted to continue with a minimum of human disturbance or change. However, because cave resources and processes are not free from human influences, actions would be taken to prevent adverse impacts and to meet resource management objectives. Additional research would be undertaken to establish a baseline against which natural changes and human impacts on fragile resources could be measured.

Carlsbad Cavern. No new buildings or impervious areas (such as roads or parking lots) would be constructed above the cavern or other cave resources to prevent potential adverse impacts on water infiltration patterns. Catchment basins would be installed in parking lots to trap petroleum byproducts washed off the pavement.

An ongoing infiltration/hazard study (see page 16) is expected to answer many existing questions about human-induced changes and threats to the Carlsbad Cavern ecosystem. Once the study has been completed, park staff would determine whether there is sufficient information to decide about the appropriateness of different types of surface facilities and activities near the cavern.

To protect the fragile resources in the Green Lake Room, King's Palace, Queen's Chamber, and Papoose Room, visitor access would continue to be only by guided tours of limited size. NPS staff would be increased and deployed more effectively to protect cave resources, especially in areas where resources are most susceptible to damage. Interpretive messages by roving staff and on guided tours would emphasize the significance of resources and how they should be protected.

Several actions would be taken to reduce the impacts of trails on the cavern. The effects of the existing epoxy resin / emery chip trail surface over an asphalt base and hydrocarbon decomposition on the cavern environment would be studied. Alternative trail surface materials that provide traction and stand up under heavy, long-term use but would not impact the cavern would be examined and applied if suitable. Old trail asphalt that is exposed to air would be sealed, or it would be removed and replaced with more appropriate base materials. Cave trails would also be reevaluated to ensure proper design and alignment. Utility conduits would be incorporated within the trail corridor during repaving. Some...
trail sections would be realigned or modified to reduce impacts from vandalism or other problems.

Studies would be undertaken to determine how to modify trail cleaning and washing techniques (depending on surface type) in order to better contain contaminants and trail surface materials (such as emery chips). Contaminant catchment traps or filters at runoff areas, drains, and catchment areas would be installed and cleaned to minimize the spread of foreign substances into off-trail areas.

In conjunction with trail redesign and realignment, the cave lighting system would be redesigned by professional cave lighting engineers to make it more efficient and easier to maintain, and to ensure that lights were positioned to minimize associated algae growth. Lighting levels in the cavern would be reduced where possible and without compromising safety or visitor enjoyment of the cavern.

In-cave tests would be conducted to determine which methods or combination of methods would be most effective in reducing or eliminating lint accumulation on cavern formations. Methods to be tested would include electrostatic treatment, supplying visitors with personal clothing covers, air vacuum devices, and trail design to better contain lint.

After these tests had been completed, action plans for cavern use and protection would describe where and how protective techniques, designs, tours, and staffing would be implemented. The plans would be subject to public involvement because they could propose actions that would limit visitor access to the cavern, as well as specific actions or maintenance practices that could affect the cavern’s resources.

**Lechuguilla Cave.** The Park Service would prioritize Lechuguilla Cave research and exploration/mapping needs; research and exploration/mapping teams would have to meet NPS guidelines. Research and exploration/mapping proposals would need to be compatible with NPS research management needs and priorities. A cave specialist could accompany parties entering the cave if deemed necessary to ensure that appropriate practices were followed inside the cave. Funding and staffing to fully implement the *Cave Management Plan* would also be sought.

The park would conduct a study to evaluate possible improvements to the present Lechuguilla Cave airlock/culvert system. It would include evaluating ways to protect the cave from unauthorized entry, to stabilize the slopes above and below the culvert, to reduce rapid airflow that occurs when the lid is open, and possibly to address the question of whether the existing culvert is the best way of accessing the cave. This study would assess the environmental effects of such actions, in accordance with the National Environmental Policy Act.

A plan to address the restoration and rehabilitation of Lechuguilla Cave resources would be developed. It would take into consideration the fact that the more people who enter this cave to assess and restore it, the more potential there is for additional impacts. Once completed, this plan would be incorporated into the park’s *Resources Management Plan and Cave Management Plan* as appropriate. Until such a plan could be prepared, the park would continue to address the most pressing resource impacts on a case-by-case basis.

**Other Caves.** Funding and staffing to fully implement the *Cave Management Plan* would be provided, allowing the Park Service to enforce existing guidelines for exploring and surveying all park caves.

Gates would be installed on all caves needing greater protection from unauthorized entry and vandalism. Gates would be designed so as not to interfere with bat flights.

A need assessment would be conducted to determine if visitors desire the type of cave experience that would be provided by guided
tours of Ogle Cave, and whether visitors would go to Ogle Cave in addition to, or in lieu of, Slaughter Canyon Cave. The assessment would also look at the cost-effectiveness of providing visitor access to Ogle Cave. If the assessment indicated that further evaluation was warranted, a subsequent study would assess the feasibility and impacts of developing visitor access to this cave. If access was needed and feasible, and if impacts were acceptable, an existing partial tunnel would be completed to provide an entrance, and a trail route would be delineated inside the cave. A surface trail to the cave from the Slaughter Canyon parking area would be developed, and guided lantern tours would be offered on a reservation basis only. If the studies indicated that opening Ogle Cave to increased visitation was not needed or would pose unacceptable risks to park resources, improved visitor access and tours would not be provided.

Although Slaughter Canyon Cave receives very little use compared to Carlsbad Cavern, it receives relatively high use compared to the park’s other caves. To ensure that future impacts to the cave’s resources were avoided or minimized, the Park Service would begin monitoring the effects of visitors in the cave. Results from this monitoring would help the Park Service better manage and protect Slaughter Canyon Cave, and help identify if there is a need to study the effects of visitors on the park’s undeveloped caves.

**Surface Resources**

Surface resources would be managed according to existing plans (see “Interrelationships with Other Plans, Projects, and Acts,” page 17), except where otherwise noted. Additional funding would be sought to fully implement these plans.

Under this alternative resource management activities would be expanded and a greater emphasis would be placed on conducting research, baseline inventories, long-term monitoring, and mitigation. For example, the role of fire in the Chihuahuan Desert would be more thoroughly studied, and results would be incorporated into the fire management program. Current inventory and monitoring procedures would be strengthened, and procedures would be added to improve information gathering about key indicators of ecosystem health. A long-term monitoring plan would be prepared to ensure that consistent, quality data were collected on air, water, vegetation, and key wildlife species.

The park would continue to work with other agencies concerning species that migrate on a small scale (e.g., deer and mountain lions). The park would also become more involved in national and international scientific efforts, such as monitoring trends in migratory bird populations.

The *Resources Management Plan* would be revised to incorporate the findings and recommendations of studies for Rattlesnake Springs outlined in appendix C. Results from the landscape report and other recommended studies would be used to revise the *Rattlesnake Springs Management Plan*, which would look comprehensively at ways to protect interrelated resource values, such as maintaining historic features while enhancing biotic resources.

The park would develop specific procedures for controlling invasive nonnative plants.

Evening patrols or closures of the park entrance road and the scenic Walnut Canyon desert drive to discourage illegal collecting of rare plants, animals, and fossils would be considered. Areas disturbed by unauthorized vehicular and foot traffic would be restored.

The park would consider closing certain backcountry trail segments and reopening others to provide more loop and shuttle options for hikers. Backcountry trail maintenance would also be improved.

Education/outreach programs that include the desert ecosystem and the park’s wilderness would be provided.
Ogle Cave Visitor Route and Internal Features

Carlsbad Caverns National Park
United States Department of the Interior
National Park Service

Ogle Cave North-South Profile

Capitan Limestone (massive member)

Ogle Cave Plan View

Legend:
- Bat guano
- Drop in floor
- Stalactites
- Stalagmites
- Columns
- Fallen columns
- Broken blocks
- Massive forms
- Pool
- Flowstone
- Potential trail route
- Passage
See Cavern Entrance Area Enlargement (Alternative 2)

Evaluate and improve airlock/culvert system

If feasible, open Ogle Cave to guided lantern tours. Provide trail to cave and complete tunnel entrance.

Provide ranger residence to monitor backcountry use

Conduct infiltration/hazard study and development concept plan to determine whether park operations should be relocated from cave area

Provide cave information pullout and kiosk

Lincoln National Forest

Carlsbad Caverns National Park

Carlsbad Caverns National Park

United States Department of the Interior
National Park Service

Alternative 2
Parkwide
Carlsbad Caverns National Park
United States Department of the Interior
National Park Service

ON MICROFILM

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Lincoln National Forest

Carlsbad Caverns National Park

See Cavern Entrance Area Enlargement (Alternative 2)

Improve Walnut Canyon desert drive

Evaluate and improve airlock/culvert system

Paved road

Unpaved road

Trail

National Park Service facility

Carlsbad Caverns National Park

Escarpment

Cave entrance

Waterline

Cavern entrance area

ON MICROFILM

Alternative 2

Parkwide

Carlsbad Caverns National Park

United States Department of the Interior
National Park Service

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If feasible, open Ogle Cave to guided lantern tours. Provide trail to cave and complete tunnel entrance.

Provide ranger residence to monitor backcountry use

Provide cave information pullout and kiosk

Conduct infiltration/hazard study and development concept plan to determine whether park operations should be relocated from cave area
**Wildlife.** A parkwide survey for reptiles and amphibians would be conducted.

Methods to improve habitat for bats and to determine the feasibility of reintroducing them would be studied. Bats would be reintroduced into previously occupied caves where possible and appropriate.

To aid in protecting the park’s bat population, which winters in Central America, the Park Service would support national and international outreach educational programs such as Bat Conservation International.

The effects of noise and vehicular activity on the bat flight would be studied. Visitors would be managed as needed to limit any adverse impacts. Bat flight observers would be confined to the present amphitheater seating area to contain noise and other impacts at present levels, unless the results of the study dictated otherwise.

In conjunction with a redesigned cavern lighting system, experiments would be done to determine how lighting affects swallows. If necessary, lights would be designed and regulated to prevent swallows from nesting beyond the normal twilight zone inside the entrance. An additional study would be programmed to find where the swallows migrate in winter.

Other resource management programs that would be undertaken by the park staff include (1) looking for more effective ways to control non-native hoofed mammal species (such as Barbary sheep), (2) cooperating with other agencies to remove such species from the park, and (3) working with other agencies to resolve conflicting policies and practices for such species.

Other programs would include summarizing and evaluating mountain lion harvest data outside the park boundary, monitoring small mammal populations in the park, monitoring breeding birds at Rattlesnake Springs, and refining monitoring methods for threatened cactus species.

**Water Resources.** Park managers would intensify efforts to monitor and restore where practicable backcountry springs and seeps that have been affected by human-made impoundments. Associated cultural resources would be fully documented and evaluated, and appropriate mitigating measures would be developed before altering the impoundments.

The park would develop a comprehensive water conservation program for meeting park and visitor needs.

Additional data are needed to provide a good hydrologic understanding of how Rattlesnake Springs functions, which in turn would help ensure that impacts to this important resource were avoided. Therefore, a study would be conducted to learn more about groundwater flows that give rise to Rattlesnake Springs and about the springs' yield and quality under varying pumping and rain/drought conditions.

Potential adverse effects on the park’s major underground water aquifer from irrigation runoff and leaks in nearby gas wells would be studied. If potential or actual effects were shown, the Park Service would work with adjacent landowners to mitigate or eliminate contamination threats. The study would also examine how the park’s overall water supply could be affected by excessive withdrawals from the aquifer outside the park boundary. The potential effect on the cultural landscape at Rattlesnake Springs would also be considered as part of this study. If adverse effects were possible, alternative strategies to cope with shortages would be considered within the context of the park’s comprehensive water conservation program, the proposed Rattlesnake Springs cultural landscape study, and the park’s water rights at Rattlesnake Springs.

**Threatened or Endangered Species.** In general, candidate, threatened, or endangered species would continue to be managed as outlined in the Resources Management Plan and the Backcountry Wilderness Management Plan.
ALTERNATIVES, INCLUDING THE PROPOSED ACTION

CULTURAL AND PALEONTOLOGICAL RESOURCE MANAGEMENT

Cultural and paleontological resources would be managed to minimize the loss of historic material and scientific information, as well as to support the interpretation of those features or attributes that are most important for public understanding and appreciation. Significant ethnographic resources would also be protected.

The Park Service would manage cultural and paleontological resources as described in "Actions Common to All Alternatives." Visitor use and development proposals described below have been designed to reduce impacts on cultural and paleontological resources by avoiding resources during development. Laws, guidelines, and policies that must be considered in planning for cultural resources are described in appendix B.

Lands adjacent to the park contain significant cultural and paleontological resources. USFS plans address cultural and paleontological concerns. The National Park Service would initiate cooperative agreements with the Forest Service and the Bureau of Land Management, neighboring landowners, and the state to enhance the protection of resources both inside and outside park boundaries. The Park Service would also work as partners with these agencies to develop and implement educational programs as a method of protecting resources. If requested, the Park Service would provide technical assistance in resource management, planning, protection, curation, conservation, and other fields.

Archeological Resources

Inventory and Evaluation. Priorities for surveys would be given to areas where visitor use and/or development was proposed, or sites that were threatened by looting or vandalism. Archeological site forms would be updated and coordinated with files at the Laboratory of Anthropology in Santa Fe.

Historic archeological remains in several caves, including Slaughter Canyon Cave and Bat Cave (a portion of Carlsbad Cavern) would be considered in the larger archeological survey and evaluation process. An inventory of the Caverns Historic District would be completed in advance of any actions to upgrade underground utilities so as to provide information about potentially sensitive areas, including eight archeological sites in the immediate vicinity.

High priorities for survey and evaluation would be established for the following areas: (1) the area below the escarpment identified as a possible site for a new operations center, (2) the Walnut Canyon desert drive, (3) information kiosk/pullout location(s), (4) the waterline corridor and the vicinity of the water storage tanks, (5) the resources at Rattlesnake Springs, and (6) significant, vulnerable pictograph sites.

Ogle Cave's historic resources would be inventoried and evaluated for their national register significance as a precursor to a feasibility study about public access. Historic artifacts in Ogle and other caves would not be disturbed until a qualified conservator and a historical archeologist had evaluated them.

Data from the above surveys and those described in the Resources Management Plan would be used to identify resources needing special protection, to help protect resources from development and visitor use, and to establish priorities. The inventory/evaluation process would be phased.

An archeological research design would be developed to guide future inventory, documentation, and evaluation of archeological resources. The park's archeological overview and assessment would be updated to reflect new findings.

Management. Proposed development areas in Slaughter Canyon have been surveyed for archeological resources, and no significant resources were found. If impacts to resources
could not be avoided during development, appropriate mitigation strategies as described in “Actions Common to All Alternatives” and “Regulatory Compliance Actions” would be implemented.

Important historic features and structures in the Ogle Cave complex would be stabilized, and protective measures would be initiated before opening the cave to visitors. Other caves that are open to visitation and that contain cultural resources would receive the same treatment. Trail design, signing, guardrails, or other protective devices would prevent visitors from inadvertently touching or straying into sensitive areas, as well as prevent vandalism. In some cases, replicas might be substituted for original artifacts vulnerable to theft. Interpretive messages would stress the protection of these resources, and the tunnel opening would be gated or fitted with an airlock to prevent unauthorized entrance and environmental damage from unnatural airflows.

A parkwide monitoring program for sites that could be threatened by vandalism or natural processes (e.g., wind, erosion, rodent activities) would be established as part of the Resources Management Plan. Visitor access and activities would also be monitored and evaluated to help ensure appropriate levels consistent with resource preservation. Based on factors such as site integrity, research potential, ethnographic significance, and vulnerability, actions would be recommended to quickly address any potential adverse effects. Areas of heavy visitor use would be thoroughly investigated, diagnostic artifacts would be collected, and surface features would be stabilized. The park would work with the American Rock Art Research Association and American Indians with traditional ties to the park area to develop measures for preventing vandalism at significant, isolated sites. The Resources Management Plan would be revised if necessary to provide guidance for discovery situations.

Visitor use throughout the park would be directed to nonsensitive resource areas; use in sensitive areas would be discouraged or prohibited. Trails would be routed to guide visitors away from sensitive resources, and resource preservation would be encouraged through interpretive programs.

Pictographs are especially vulnerable to weathering, deterioration, and vandalism. A pictograph conservation/protection plan would be developed in cooperation with established experts, including affiliated American Indian groups, to prevent damage or deterioration of significant sites. This plan would also make recommendations regarding protective devices, signing, visitor education, or other means of preventing vandalism to pictograph sites.

Rangers would routinely patrol areas containing vulnerable sites, and swift, comprehensive, and consistent law enforcement would be used to deter vandalism and looting. To supplement ranger patrols, ranger surveillance would be increased in areas such as Slaughter Canyon. Cooperative law enforcement efforts with the Forest Service and Bureau of Land Management would help protect sites and remains in backcountry areas.

An important concept is the sense of “presence,” a management approach that demonstrates to visitors the significance of sites through subtle actions such as interpretive signs and programs, fences, and ranger patrols. A ranger residence near Slaughter Canyon would provide an NPS presence in this area.

Interpretive programs would aid in protecting sites by helping visitors understand and appreciate the scientific, aesthetic, and American Indian religious and traditional values of the resources. This information would be developed in consultation with tribal authorities.
ALTERNATIVES, INCLUDING THE PROPOSED ACTION

Historic Resources

The Caverns Historic District would continue to be managed to preserve the historical scene and the cultural landscape. Depending on the results of infiltration studies, there are two scenarios: (1) structures within the district could be adaptively used for housing and environmental education, or (2) maintenance or other functions could be removed from the area, with the buildings being adapted for dry storage or other passive uses that would not pose a threat to underground resources. Any such actions would be preceded by appropriate investigations and documentation. Work would be in accordance with the Secretary of the Interior's Standards for Rehabilitation (NPS 1990).

The redesign of the visitor center interior would respect and avoid alterations to any historic elements of the old structure that retain integrity. Design and materials used in the building’s exterior and in adjacent visitor facilities, such as trails and overlooks, would be in keeping with the historic district and the surrounding cultural landscape.

The Resources Management Plan and the Rattlesnake Springs Management Plan would be revised to incorporate the findings of the studies outlined in appendix C.

Water control features and other historic features at backcountry springs would be protected until their significance was determined. Once they had been evaluated, mitigating measures would be developed before any action was taken.

Ethnographic Resources

The park would establish a permanent dialogue with American Indian groups culturally affiliated with park sites and landscapes. In cases where tribes were willing to share information about sites, data would be recorded and sites evaluated as described above for archeological sites. In cases where strong American Indian concerns would make formal nominations of religious sites to the national register impracticable, minimal data necessary for site protection would be maintained in secrecy. Affiliated American Indian groups would be formally notified in writing, and they would be consulted before any significant development or new program or policy, including archeological investigations, was undertaken that could affect culturally significant properties, such as sacred sites.

Park plans such as the Resources Management Plan as well as the forthcoming interpretive plan and cultural landscape management plan, would be revised to reflect nonconfidential information shared by tribes. Portions of the Resources Management Plan responding to confidential information would be treated separately.

Results of evaluations and consultation with affiliated Indian groups would also guide decisions regarding the suitability of sites for research, interpretation, and special treatment or protection. Consultation would help ensure that research would not diminish traditional values of sites. Ethnographic sites would generally be protected like archeological resources, and protective measures for sacred sites would be worked out in consultation with concerned groups.

Nonconfidential information about these American Indian groups could be used in the park’s interpretive programs so that visitors would have the opportunity to see park resources from the perspective of a different culture. Interpretive programs would contain information that would contribute to a better understanding of the Indian perspective of the park and that would be acceptable to traditional Indian authorities.

The park would strive to ensure privacy for American Indians to pursue their religious activities without interference or inappropriate observation by others. NPS training programs would cover the etiquette to be followed when NPS personnel encounter religious activities or sensitive sites.
Museum Resources

All paleontological (and other natural specimens) from the park held by non-NPS institutions would be located and catalogued to NPS standards. The park’s paleontological collections would be thoroughly analyzed by a qualified professional.

All collections, including paleontological resources, would be curated to NPS standards.

Paleontological Resources

A paleontological research plan would be developed to guide research and treatment proposals so they would be beneficial to park programs. The research plan, developed in consultation with established authorities, would prioritize research proposals and help direct permitting.

An inventory and analysis of the park’s existing paleontological collections and accompanying documentary materials would be completed. Materials previously removed from the park and currently housed at non-NPS institutions would also be identified and inventoried. All data would be incorporated into the Smithsonian Institution’s nationwide FAUN-MAP system. New paleontological resources would be inventoried as they were discovered.

Appropriate management measures would be developed in consultation with professionals in several disciplines, including paleontology and archeology, for resources that were threatened by caving activities, natural processes, or vandalism. Training for staff and avoidance of resource areas during caving activities would be a primary goal. The park would work with other agencies, including local museums, to develop interpretive and educational programs, brochures, and preservation techniques. Cave restoration projects would take these resources into account during planning. The existing Cave Management Plan would be revised to ensure the protection of paleontological remains. The park would require cavers to avoid disturbing paleontological remains or the surrounding context, and it would ensure the protection of such resources until they could be fully evaluated by a paleontologist. During the construction of trails or other facilities, paleontological resources would be avoided or appropriate mitigation strategies devised.

VISITOR USE

Carrying Capacity

Carlsbad Caverns National Park now hosts over 600,000 visitors a year. Almost 90% of this use occurs in and around Carlsbad Cavern. With this level of visitation expected to continue, and perhaps increase in the near future, the potential for visitors to further damage park resources is great. Large numbers of visitors using the site at one time can affect the quality of visitor experiences. Also, Public Law 95-625 requires the National Park Service to address carrying capacity in planning for parks. It is therefore important to address the concept of carrying capacity in planning park infrastructure and visitor management programs. The National Park Service would conduct a carrying capacity study using a visitor experience and resource protection (VERP) process as soon as feasible.

Carrying capacity at Carlsbad in the past has been addressed and defined in terms of physical or facility capacity limits. For example, carrying capacity has been discussed in terms of the number of cars and buses that could be parked in the visitor center parking lots at one time or how many people could be transported in and out of the cave on the elevators. These capacities relate to visitors’ abilities to access the park and the cave resources, but they do not necessarily directly relate to the quality of the visitor experience, nor to the protection of the park’s significant resources. When these physical limits are reached, vehicles are stopped from entering the park, and visitors must wait in line to use the elevators. Under existing conditions, the park is
being managed to maximize visitor access. The visitor experience / resource protection process would change this emphasis.

Under the VERP approach carrying capacity is defined as the type and level of visitor use that can be accommodated while sustaining the desired resource and social conditions that complement the purposes of the park and its management objectives. Thus, discussions of carrying capacity are now focusing on protecting the quality of the visitor experience and protecting resources rather than on visitor numbers.

The VERP approach is typically carried out through a series of steps, as described below:

(1) Statements of the park purpose, significance, and primary interpretive themes are developed. (This step has already been completed for Carlsbad Caverns National Park.)

(2) Park resources and visitor experiences are mapped and analyzed.

(3) The spectrum (or range) of desired resource and social conditions (potential management zones) is established.

(4) Zoning is used to identify appropriate visitor use and resource protection areas for management purposes.

(5) Quality indicators are selected and associated standards are specified for each management zone. (These indicators are qualities that can be readily observed and monitored and are related to the conditions that are to be achieved for the park.)

(6) Desired conditions are compared to existing conditions to determine consistency or discrepancy with the desired resource and social conditions for each zone.

(7) When discrepancies are found, the probable causes of discrepancies between the desired and existing conditions are identified and described.

(8) Management strategies to address the discrepancies are defined/refined. A program of continuous monitoring and evaluation is implemented to ensure that desired resource and social conditions continue to be achieved.

Pending the implementation of this process at the park, some interim measures to address carrying capacity, particularly in the cavern, would be taken under the proposed action. Visitor entry into the park would be temporarily halted when the parking lots were full. Visitors would be encouraged to visit the park during the shoulder seasons and off-season to help spread use throughout the year and to reduce crowding during the summer; and the park would consider offering discounts for weekday or off-season tours. Local, regional, and state tourist industries would be asked to assist in this effort, which would benefit them as well as the park. The size of guided cave tours would be monitored and adjusted as necessary to protect cave resources, while providing a quality cave tour experience.

Regional Information, Orientation, and Access

The park would work closely with motel operators and cable television companies to broadcast park information for overnight guests in the region and to explore other methods for reaching visitors. Pre-arrival packets would be developed to facilitate trip planning and entry procedures for organized tour groups.

Visitors would continue to drive to existing parking areas near the visitor center on top of the escarpment. A new informational kiosk outside the park entrance would offer general information about the park and specific information about cave tours. Materials at the
kiosk would tell about the type of cave tours, levels of difficulty, time required, cost, and other things to do in and around the park.

**Carlsbad Cavern Visitor Center**

Interpretive exhibit kiosks in both parking lots would tell about cave tour options. A cashier window and self-serve cave tour ticket machines would be available. Wayside exhibits at a fully accessible viewing/resting area outside the visitor center would identify what can be seen, and the exhibits would also delineate the location of underground resources.

Inside the visitor center visitors could go to an information desk to ask uniformed park employees specific questions about their visits. Exhibits would focus on themes and topics that cannot be interpreted very effectively in the cave (for example, bats), as well as introducing visitors to the Chihuahuan Desert and other park resources. A new audiovisual program would tell people about Lechuguilla Cave.

Before entering the cave, most visitors would go to an orientation theater near the elevators to see a short video about safe and proper conduct in the cave. The theater would be sized to the capacities of the elevators, and the program would be timed to maximize the elevator turnaround time of five minutes. Visitors would exit the theater to the elevator lobbies and take the elevators down to the Big Room to begin their tours. Visitors using the natural entrance to the cave would go to the east end of the visitor center for orientation and then follow the path to the natural entrance.

Concession operations in the visitor center would be reorganized to be more space-efficient. The concession food service would be converted to fast food, cafeteria style, or other type service capable of serving large numbers of visitors quickly and efficiently. Providing outdoor eating space would be considered. Merchandise sold in the gift shop would be more reflective of park interpretive themes. The gift shop and kennel services for pets would be retained.

**Interpretation Underground**

Interpretive programs would be geared to give visitors an informative and enjoyable cavern experience, while at the same time emphasizing the need to help protect resources. The Big Room tour would continue to be self-guided, with interpreters stationed in sensitive areas to talk with visitors and help protect resources. Low-profile wayside exhibits printed in English and Spanish would continue to interpret key features, topics, and concepts. Visitors could also use cave audio-tour information to supplement the printed exhibits.

The park staff would continue to evaluate the impacts of self-guided tours, keeping the option to institute guided tours along the natural entrance route if necessary. When interpreters were available, off-trail tours would continue to be offered, with an optimal number of visitors for each tour based on the park's management objectives to protect resources and provide a quality visitor experience. In addition to guided tours of Slaughter Canyon Cave, guided tours of Ogle Cave might be offered (see page 40 for more information). Visitors would be able to make reservations for guided tours in advance.

An area near the underground elevator lobby would be used for interpretive functions. One portion would be designated for assembling visitors with tickets for the King's Palace tour and for some off-trail tours. Another portion would be used for handing out and collecting cave audio-tour equipment. Some interpretive exhibits could be provided in this area.

**Interpretation on the Surface**

About a half-mile section of the old guano road would be signed as an interpretive trail. Beginning at the amphitheater (or as a spur off the
nature trail), the interpretive route would lead to the second natural entrance to Carlsbad Cavern and possibly extend a short distance beyond. Wayside exhibits would tell about the guano mining operations and the early use of the road for bringing visitors to the cavern.

Another self-guiding geologic interpretive trail would be developed near the visitor center. Wayside exhibits along this trail would interpret relationships between surface and subsurface resources, and they would identify former cave features now naturally exposed on the surface.

At Slaughter Canyon a new exhibit kiosk would be installed at the parking lot and at the trailhead for Slaughter Canyon and Ogle Caves. The exhibit would tell people about the difficulty of hiking to the cave entrances, the importance of bringing water, the need for tour reservations, and applicable regulations and safety precautions about hiking in the desert.

Information at Rattlesnake Springs wayside exhibits near the picnic area parking lot would be expanded to tell about the natural and historical resources of this area.

Educational Program

Since not all activities would be conducted in Carlsbad Cavern, an environmental education facility would be provided, possibly in the current headquarters building.

In addition, an educational program targeting school groups would be developed, and a seminar series coordinated by the park’s cooperating association would be continued. (Guest speakers are invited to present programs on various aspects of cave research, exploration, and related topics.)

GENERAL DEVELOPMENT

Cavern Entrance Area

No buildings or parking lots would be added on the escarpment in the vicinity of the cavern so as to prevent further alteration of surface drainage patterns and other potential impacts to cave resources. Where possible, new or repaved surfaces in nonvehicular areas would use materials that allow surface water to infiltrate, thus ensuring natural subsurface recharge.

Once sufficient information has been gathered about water infiltration patterns and potential impacts and hazards from contaminants, a development concept plan would be prepared to specify what actions to take to protect Carlsbad Cavern from the effects of surface activities and developments and to analyze the specific impacts of those actions in accordance with the National Environmental Policy Act. The range of possible actions called for could include the following:

- **Technological measures** — Technological measures would seek to mitigate the impacts of some human activities and development on the cavern. For example, if residential sewerlines were shown to be a significant threat to the cavern, replacing the lines with a leakproof material or design that would eliminate the threat or reduce it to an acceptable level might be more cost-effective than removing residential uses from the escarpment.

- **Partial relocation of facilities** — If technological measures would not reduce cave resource threats to an acceptable level, some facilities could be moved from above Carlsbad Cavern. An in-park relocation site off the escarpment would be preferred, if access was feasible. Such a location would minimize the risk of placing facilities above new, as yet undiscovered caves, since caves commonly form in the bedrock of the escarpment but not in the surrounding lowlands. A potential site for relocating facilities has been identified east...
of the existing sewage lagoons at the base of the escarpment. In this case, either the existing maintenance road to the sewage lagoons would be upgraded to provide access or a new road from U.S. 62/180 would be constructed to the south (see the Alternative 2 — Parkwide map). A lease or transfer of BLM land in the vicinity of Whites City would also be considered for relocating facilities. Appendix E describes guidelines for siting and designing new facilities.

• "Maximum" relocation of facilities — This option would involve moving all facilities except historic structures and the existing visitor center off the escarpment. The headquarters function could be consolidated with administrative offices (moved from the city of Carlsbad) and other functions at a new operations area. The park resource collection, curator's office, and cave research offices would also be moved to the new operations area. The existing headquarters building would be remodeled into an environmental education center, with space for school groups to conduct activities in a classroom/laboratory setting. The park library would be moved to the visitor center to make it more readily available to the interpretive staff.

Maintenance functions critical for safety and visitor services at the visitor center or cavern (supply storage, janitorial supplies, plumbing, elevator mechanical, and structural firefighting equipment) would be moved to the visitor center, and all other maintenance functions moved to the new operations area. Two maintenance structures not contributing to the integrity of the Caverns Historic District would be removed and their sites restored to native vegetation compatible with the cultural landscape.

Residential structures above the cavern not contributing to the integrity of the historic district (the 12 housing units in two buildings dating from the 1960s) would be removed and the sites restored. Seasonal employees and two permanent employees required to respond to park emergencies could be moved to new housing in the new operations area at the base of the escarpment. (Seasonal employees typically cannot afford short-term leases in the city of Carlsbad). Alternatively, the park could seek a long-term lease agreement with private entities in Whites City or Carlsbad to provide housing for these employees. Other park employees would be responsible for finding their own housing in the private sector. Nighttime patrols would be provided at the cavern entrance and as needed for security and safety.

Limited adaptive use of remaining buildings in the Caverns Historic District (for example, to store dry goods, tools, or certain resource collection items) could be permitted if the use did not threaten the cavern. Sewer- and waterlines would be plugged with an inert material or removed. Structural fire protection would continue to be provided by the park's mobile pumper unit.

Before the two noncontributing maintenance buildings were removed from the historic district/landscape, or adaptive use was made of other district structures, a memorandum of agreement would be negotiated among the Park Service, the state historic preservation officer, and the Advisory Council on Historic Preservation regarding the treatment of the entire area. The structures to be removed would be fully documented prior to demolition, and appropriate archeological investigations or monitoring would ensure that no archeological resources were destroyed. Buildings to be adaptively used would also receive appropriate documentation and evaluation, and proposed adaptive uses would be compatible with their preservation.

Factors likely to affect which option is proposed in the future development concept plan include the nature, severity, and location of cave resource impacts, the results of hazard or accident scenarios, the cost of relocating facilities, effects on cultural and scenic resources, and the ade-
quacy of technological measures to reduce or eliminate threats. The National Park Service’s first responsibility is to protect the park’s cavern resources. Although relocating functions or facilities off the reef formation would be costly, contaminants introduced into the cavern during an accident such as a propane spill, sewerline rupture, earthquake, or fire could irreversibly damage cave formations and processes, close the cavern for months or years, and result in millions of dollars in cleanup costs and lost revenue.

If the development concept plan did not call for relocating residential uses off the escarpment, two existing residences would be retained for permanent employees required to respond to park emergencies, and other residences would be remodeled for seasonal use as dormitories and family apartments. Most permanent employees would move to private sector housing, probably in Carlsbad.

Visitor Center

The visitor center would be remodeled to improve space utilization and circulation. Changes to the building’s exterior and immediate surroundings would include (1) remodeling the building to be more visually congruent with the historical and natural scene; (2) making the entrance more prominent; and (3) providing outdoor shaded space for visitors to get cave tour information, to purchase tickets, to queue on busy days, to enjoy the panoramic views, and to eat. In conjunction with these changes, vehicular circulation in the parking lots would be evaluated, and if necessary, changes would be made to reduce pedestrian/vehicular conflicts and drivers’ confusion. Catchment basins would be installed in the parking areas to trap petroleum products leaked from vehicles to keep these compounds from entering the cavern.

Interior spaces in the visitor center would be reorganized so visitors could be oriented more efficiently, while also permitting them to enjoy exhibits, interpretive films, refreshments, and shopping for books and other gifts at their leisure. The redesign would allow park staff to gather and direct visitors to the elevators at regular intervals, helping to distribute visitor entrances into the cavern during the day. More efficient use of both indoor and outdoor areas would free up space in the building for interpretive offices and work space, permitting the removal of the temporary structure on the building’s north side (see the accompanying conceptual plan for the visitor center and appendix F).

Park Roads and Trails

Walnut Canyon Desert Drive. The scenic one-way Walnut Canyon desert drive would be improved to address resource protection and maintenance concerns. The road would be stabilized by adding crushed aggregate (stone) containing cementitious fine material to hold the stone in place, and possibly by applying a natural, resin-based, dust-reducing material in short sections most in need of treatment. (This method of improving the road would permit continued infiltration of water to subsurface areas and would not introduce new potential for hydrocarbon materials to migrate to the subsurface.)

Trails. A new geologic interpretive trail, as discussed under “Interpretation on the Surface” above, would be developed near the visitor center. If Ogle Cave was opened to limited guided tours, a trail to the cave would be built from the Slaughter Canyon trailhead.

To minimize soil erosion caused by foot traffic, trails would generally be constructed on slopes less than 15%. Geologic features and cultural resources would be avoided. Trails would be well-defined where heavy foot traffic was anticipated, and signs would remind visitors to stay on the treadways.
Provide outdoor spaces for purchasing tickets, resting, enjoying views and eating.

Move interpretive staff to visitor center and remove temporary building.

Redesign interior and exterior of visitor center to improve space utilization and circulation.

Provide geologic interpretive trail and overlook (route to be determined).

Major functions (headquarters, maintenance, housing) might be moved off escarpment and nonhistoric structures might be removed. Decision pending outcome of infiltration/hazard study and development concept plan.

Alternative 2
Cavern Entrance Area
Carlsbad Caverns National Park
United States Department of the Interior
National Park Service

July 1996 • 130 • 20.023A
Conceptual Layout of Uses and Spaces
Visitor Center Reorganization
Carlsbad Caverns National Park
United States Department of the Interior
National Park Service
DSC • July 1996 • 130 • 20,034

Visitor Center Lower Level

Visitor Center Main Level

1. Outdoor Lobby
   • tour and fee info kiosks
   • ticket sales
   • interpretive terrace
   • viewing / seating area
2. Food Service Outdoor Area
3. Indoor Lobby
   • former atrium
4. Concessions
   • merchandise sales
   • food sales
   • kitchen
   • storage
5. Interpretive Staff: Library / Work Area
   • former concession nursery area
6. First-Aid Room
7. Visitor Passageway to Elevators
8. Restrooms
9. Multipurpose Room
10. Audiovisual room
11. Main Visitor Circulation Area
12. Exhibits - displays and video monitors
   • bats
   • Chihuahuan Desert
13. Interpretive Staff Office
    • portion of former glassed-in porch area
14. Books Etc.,
    • sales
    • storage
15. NPS Staff Support Area
    • lounge
    • kitchen
    • work area
    • lockers
    • toilets
    • storage
16. NPS Staff Outdoor Area
17. Building Services / Storage
Other Areas

The park would work with Whites City to find a mutually acceptable location for an information kiosk just outside the park entrance. The kiosk would be located and designed so as to attract the attention of visitors desiring more cave-related information, and it would allow them the flexibility of purchasing food or other items in Whites City before entering the park. Existing parking areas would be used if possible.

A permanent, year-round ranger residence would be provided just inside the park boundary on the west side of the road to Slaughter Canyon. A full-time ranger in this area would improve the monitoring of backcountry use, help protect backcountry caves and archeological sites from vandalism and unauthorized entry, and be able to respond to backcountry emergencies more quickly. The ranger here would also be able to monitor visitor use of the canyons to the west. Backcountry permits would be issued by the ranger stationed here, but the residence would not serve as a visitor contact station; backcountry and cave orientation information would continue to be provided at the visitor center and at an expanded informational kiosk at the Slaughter Canyon trailhead. Sustainable technologies would be used to the maximum extent feasible to provide services such as energy and water to the residence. Existing vault toilets at the Slaughter Canyon trailhead would be replaced with lower maintenance toilets.

The deteriorating Putman backcountry cabin would be replaced with a sturdier structure (including a secured storage area) to reduce the threat of hantavirus. The cabin’s current use as a base for ranger patrols, trail crews, and firefighting crews would continue.

In general, topsoil removed from areas to be covered by pavement or buildings would be used to make up any shortage incurred in installing other facilities, thus minimizing the overall loss of organic matter. After construction, all disturbed areas not covered by development would be restored to their natural grade and reseeded with native species to speed the rate of recovery and to minimize the encroachment of invading species. To the extent possible, buildings, roads, and other impervious structures would be designed to collect and channel runoff into natural drainages.

PARK OPERATIONS

A ranger residence would be provided just inside the park boundary on the road to Slaughter Canyon, and the information kiosk at the Slaughter Canyon trailhead would be expanded. These facilities would provide a greater NPS presence and better protection of backcountry resources, particularly cave and cultural resources (see also the preceding discussion under “General Development”).

The Guadalupe Ridge trail connects Guadalupe Mountains and Carlsbad Caverns National Parks. The Park Service would facilitate cooperative management of the trail with the U.S. Forest Service and the Bureau of Land Management. The portion of the trail within the park would be maintained at a primitive standard. The Backcountry / Wilderness Management Plan would be amended to define the width of the corridor to prevent any encroachment into adjacent wilderness. The Park Service would also seek a memorandum of agreement with the Bureau of Land Management to provide for consistent backcountry management in the Guadalupe Ridge area by the two agencies.

The National Park Service, the U.S. Forest Service, and the Bureau of Land Management have three common objectives for the Guadalupe Ridge / Lonesome Ridge area: (1) protect caves, and cultural and paleontological resources; (2) allow recreational access to these scenic lands; and (3) protect, interpret, and make the geologic resources of the Capitan Reef / Guadalupe wilderness study area / Lonesome Ridge areas accessible for scientific and educational purposes. To help achieve these objectives, the Park

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Service would cooperate with the U.S. Forest Service and the Bureau of Land Management in sharing technical assistance and pursuing other actions.

MINOR BOUNDARY ADJUSTMENTS

Minor boundary adjustments and land exchanges with other federal agencies that are to the mutual administrative benefit of both agencies would be considered. Boundary adjustments and land exchange proposals would be made in accordance with established NPS criteria (1991b). Any such proposals would be evaluated and documented separately, in accordance with the National Environmental Policy Act.

LAND USE AND MANAGEMENT

Management zones indicate how park lands are to be used in accordance with protecting the park's significant resources and providing a quality visitor experience. Management zones have been developed for the proposed action based on the park's purpose and significance (especially significant resources), the desired visitor experience, and established and proposed uses. Most of the park is managed as wilderness, as legislated by Congress. Much of the rest of the park would be managed as a natural zone to ensure the protection of important natural resources. Relatively small areas would be zoned for cultural resource protection, NPS development, and special uses. Management zones and subzones are described below; the Management Zoning map for the proposed action indicates the management emphasis for specific park lands.

Natural Zone

Lands in the natural zone would be managed to conserve natural resources and processes, while accommodating uses and activities that would not adversely affect the area's ecological integrity. The natural zone is divided into the following two subzones:

Natural Environment Subzone (±12,875 acres). The natural environment subzone would remain largely undeveloped and would be managed to conserve natural resources. Environmentally compatible interpretation and recreational activities would be accommodated.

Wilderness Subzone (±33,125 acres). The wilderness subzone consists of lands designated as wilderness by Congress. Legislation requires that these lands be managed in such a manner as will leave them unimpaired for future use and enjoyment as wilderness. Public purposes of wilderness include primitive recreation, scenic preservation, scientific study, education, conservation, and historical use, in accordance with the 1964 Wilderness Act. In this subzone park managers must select the minimum tool or administrative practice necessary to successfully and safely accomplish management objectives with the least adverse impact on wilderness character and resources.

Cultural Resource Protection Zone (±49 acres)

The cultural resource zone would be managed to preserve, protect, and interpret cultural resources and their settings. This zone includes significant archeological sites whose uniqueness and excellent condition warrant special protection. (To discourage vandalism of these sites, they are not shown on the Management Zoning map.) The cultural resource protection zone also includes the Rattlesnake Springs Historic District.

Park Development Zone

This zone includes lands for facilities that serve visitors and park management, and where park development or intensive use may substantially alter the natural environment. The park develop-
ment zone is divided into two subzones, as described below.

**Carlsbad Cavern Protection Subzone (±184 acres).** This subzone consists of the developed area surrounding the natural entrance of Carlsbad Cavern, including the Caverns Historic District. Contributing features and the historical appearance of the Caverns Historic District would remain intact. Management in this subzone would be focused on providing surface facilities and activities in ways that minimize or eliminate potential adverse effects on the cavern. This subzone could be modified after the infiltration/hazard study had been completed and a development concept plan has been prepared to address the specific actions needed to reduce or eliminate adverse effects of surface activities and development.

**Other Development Subzone (±222 acres).** This subzone would include visitor facilities, administrative/maintenance facilities, employee housing, major utilities, and roads used regularly by park managers or visitors outside the Carlsbad Cavern protection subzone. The subzone has been restricted to the smallest area needed to accommodate required development and use. New development would be allowed only after considering alternative levels of use, facilities, services, and sites. Specific areas in this subzone are the area at the base of the escarpment where NPS operations could be relocated; the western (nonhistoric) portion of the detached Rattlesnake Springs unit; the trailhead area at the mouth of Slaughter Canyon; and the site just inside the park boundary on Slaughter Canyon road identified for a new ranger residence.

**Special Use Zone (±340 acres)**

The special use zone includes one tract of private land just inside the far western park boundary. The park's *Land Protection Plan* proposes the acquisition of this land by donation or exchange if the opportunity arises.
PLAN IMPLEMENTATION

Phasing

Alternative 2 would be implemented over the next 15 years in three phases (see appendix D). The first phase would give priority to scientific studies needed for making sound decisions about how to protect significant resources (for example, Rattlesnake Springs resource studies); other easily implementable actions having significant beneficial resource impacts (such as installing an airlock at Lechuguilla Cave); the evaluation of serious maintenance concerns; and addressing immediate interpretation needs (such as interpreting Lechuguilla Cave). If these studies indicated adverse effects on significant resources, corrective actions would necessarily be the park's highest priority.

The second phase would include actions to address less critical resource protection needs, maintenance needs, and orientation/interpretation needs (such as providing a cave information pullout near Whites City).

Actions in the third phase would depend on the results of phases one and two and would include lower priority resource protection or interpretive needs.

Costs

Construction. Depending on what actions were proposed in the future development concept plan, estimated construction costs for this alternative range from $21,736,213 (plus an additional $2 million assuming minimum technological measures were sufficient to mitigate cave resource impacts) to about $44,219,141 (assuming the maximum relocation scenario; see appendix D).

Staffing. Alternative 2 would require 51 additional full-time positions and increased funding to improve resource protection and visitor service. (A full-time employee or FTE is one person working full time for one year. One FTE could also consist of two people working half-time for a year.)

- Management and Administration — 3 additional positions
- Resource Management and Visitor Protection — 2 additional "non-recurring" positions, 22 "recurring" positions (non-recurring refers to positions required for a limited time; recurring refers to positions required as permanent increases in park staff because of permanently increased workload)
- Interpretation and Visitor Services — 20 additional positions (some of these positions would be paid by charging fees for additional interpretive services)
- Maintenance — 6 additional positions.

The estimated annual budget for salaries for the proposed action is $4,080,000 in 1995 dollars.

Other. Funds for studies recommended in the proposed action (see appendix D) would also be needed, but these costs have not yet been estimated. Typically, costs for such studies range from about $20,000 or less for simple studies to as much as $350,000 for comprehensive studies like the Ogle Cave need and feasibility assessment.

If funding and staffing for some elements of the proposed action were unavailable from federal sources, the park would consider other options, such as expanding the park volunteer program or developing partnerships with other agencies, organizations, or businesses to accomplish these elements. The park might also make use of "improvement accounts" (special accounts funded by concession fees) for concession-related capital expenses. These could include improvements for infrastructure used by concessioners, such as buildings, roads, and utilities.
ALTERNATIVE 3

Alternative 3 would propose immediate and comprehensive measures to reduce or eliminate threats to cave resources from surface facilities because there is reason to believe that such development and associated activities are already having detrimental effects that should be stopped as soon as possible. Many surface facilities above the cavern would be removed within five years. A new orientation/transit center would be constructed at the base of the escarpment, and a shuttle system would transport visitors to the cavern entrance. Visitor use in the cavern would be monitored and restricted to minimize further damage to cave resources. No special off-trail cave tours would be provided.

The following actions would complement programs described in approved NPS plans (see page 16) and are consistent with the objectives of those plans, except where otherwise noted.

NATURAL RESOURCE MANAGEMENT

Subsurface Resources

This alternative would propose the same basic actions and mitigation measures described for alternative 2, but additional subsurface resource management actions would be implemented. Guidelines for exploration, surveying, and research in all park caves would be completed and implemented. NPS cave resource management funding and staffing levels would be increased. Gates would be installed on all backcountry caves that need increased protection from unauthorized entry and vandalism.

Surface facilities above Carlsbad Cavern except for historic buildings and the visitor center would be removed to eliminate existing and potential threats to the cavern, and many functions would be relocated off the escarpment. Visitor center parking would be removed in conjunction with providing a shuttle service to the visitor center area. Paved parking areas would have drainage traps and catchment basins to prevent vehicle fluids from infiltrating to underground resources. All self-guided cave tours would cease, and only guided tours in established public portions of the cavern would be offered. The number of people for each tour would be limited to minimize resource damage (tour capacity would be based on further studies). No special off-trail cave tours would be conducted.

More stringent measures to eliminate or nearly eliminate lint than described under alternative 2 would be implemented. This could include providing coveralls for all visitors, electrostatic collectors, air-pressure cleaners, and/or trail redesigns using partial enclosures that trap or localize the dispersal of lint.

Visitor access trails in the cavern would be resurfaced with more appropriate materials (material composition would be determined by study and experimentation), and all old asphalt and other past discarded materials would be removed from the cavern. Routine maintenance and trail washing methods would be improved to eliminate the dispersal of trail materials, such as emery chips. Trail washing effluent would be trapped and filtered, and contaminants removed.

A cave specialist would be required to accompany every party that enters Lechuguilla Cave to ensure resource protection.

Surface Resources

Surface resource management actions and mitigation measures would be the same as described for alternative 2.
CULTURAL AND PALEONTOLOGICAL RESOURCE MANAGEMENT

Cultural resources would be inventoried, evaluated, and managed as described for alternative 2, with the following additions.

An archeological survey would be conducted for the area below the escarpment proposed for a park operations center. The area proposed for the transit/orientation center has been surveyed, and several archeological sites (both historic and prehistoric) were found. Two of these sites are extensive and contain a rich variety of artifacts and features. Construction would be sited to avoid impacts on these resources.

The documentation and evaluation of resources at Ogle Cave would be completed, but would be of lower priority than under alternative 2 because the cave would not be opened to guided tours.

VISITOR USE

Carrying Capacity

Visitation to Carlsbad Cavern could be regulated by limiting the frequency and capacity of shuttle transportation to the cavern entrance area. Visitors would visit the cavern only while on guided tours of limited size. Tour size would be monitored and adjusted as necessary to protect cave resources, while providing a quality cave tour experience.

Regional Information, Orientation, and Access

As described under alternative 2, visitors would begin receiving information about the park before they arrived at the orientation/transit center. Signs would inform them of the park’s operating hours and the fact that they must ride a shuttle system from a transit area off the escarpment to the cavern entrance. The park would also provide pre-arrival packets to facilitate trip planning and entry procedures for organized tour groups, as described in alternative 2, plus an offsite cave tour reservation system.

Carlsbad Cavern Orientation and Visitor Center

Under alternative 3 visitor parking and overall information and orientation functions would be moved to a new facility at the base of the escarpment near Whites City. Here visitors would decide about cave tour options, purchase tickets, find out about shuttle schedules, and get questions answered. Merchandise sales and restaurant-style food service would be relocated off the escarpment, possibly to the new orientation/transit center.

From the orientation/transit center visitors would ride a shuttle to the cavern entrance. At shuttle stops along the park entrance road visitors would have opportunities to view and learn about aspects of the Chihuahuan Desert and related human history. Wayside exhibits would continue to carry interpretive messages.

The visitor center on top of the escarpment would be the staging area for guided tours of the cavern. Exhibits similar to those described under alternative 2 would be displayed in the lobby. Cave preservation would be emphasized, along with messages about how visitors could help reduce resource impacts. A new audiovisual program would interpret Lechuguilla Cave. As in alternative 2, fully accessible wayside exhibits outside the visitor center would identify elements of the viewshed and illustrate the location of cave resources below the surface.

Interpretation Underground

All tours of Carlsbad Cavern and Slaughter Canyon Cave would be guided by park interpreters. Studies would determine the optimum number of people per tour that would balance the need to protect fragile resources and to provide
ALTERNATIVES, INCLUDING THE PROPOSED ACTION

a high quality visitor experience. Tours would be confined to the public areas of the caves, reservations would be required, and no off-trail tours would be offered.

Interpretation on the Surface

The nature trail adjacent to the visitor center would remain, as described in alternative 1. The trail along the old guano road, which connects Whites City and the cavern entrance area, would be signed, improved, and interpreted, and key resources would be explained at wayside exhibits.

At the orientation/transit center near the park entrance visitors could obtain a special pass to drive their private vehicles into the park and along the 9-mile Walnut Canyon desert drive; however, private vehicle access to the visitor center at the cavern entrance would not be permitted.

The present amphitheater seating area would continue to be used for bat flight programs, but visitors would be required to take shuttles up to the area; private vehicle access would not be allowed.

At Rattlesnake Springs interpretive exhibits would tell about the natural and historical resources, as described under alternative 2. Additional information would be posted in a bulletin case near the parking lot for the picnic area.

At Slaughter Canyon a staffed visitor contact station would be provided near the mouth of the canyon. Park staff would issue permits for backcountry use, and exhibit panels would tell about the difficulty of hiking to the cave entrance, the need to bring water, the fact that cave tours are by reservation only, and applicable regulations and safety precautions about hiking in the desert.

Educational Program

The park educational programs would be the same as for alternative 2.

GENERAL DEVELOPMENT

Existing roads and trails would remain, except for one minor trail spur from the east visitor center parking lot. The trail along the old guano road would be improved for hiking.

Except for historic buildings and the visitor center, surface facilities above Carlsbad Cavern would be removed to reduce threats to cave resources. Most orientation services would take place at the new orientation/transit center, which would include park-related information and ticket sales, a transit staging area, and possibly merchandise sales and food service. Many park operation functions would be relocated to a new operations center off the escarpment. New or modified facilities would require detailed site planning.

The headquarters function would be moved from the Caverns Historic District to the new park operations area. Administrative offices would be moved from the city of Carlsbad and consolidated with the headquarters function; administrative support for Guadalupe Mountains National Park would continue to be provided. Cave resource management and cooperative cave research offices would also be consolidated with the headquarters and administrative functions.

Most maintenance functions would be moved from the Caverns Historic District to the new park operations area. Maintenance functions that must remain on the escarpment for safety or efficiency (elevator, plumbing, janitorial, supply storage, and structural fire) would be accommodated in the existing visitor center.

Seasonal employees would move from existing substandard dormitories to new housing in the park operations area. Permanent employees
would also move to new housing in this area. Nighttime patrols would be provided in the vicinity of the cavern entrance as needed for security and safety.

Vacated historic buildings would be maintained to preserve the integrity of the Caverns Historic District. Limited adaptive use of these buildings (storage for dry goods, tools, etc.) would be permitted if such use did not threaten the cavern below.

Two existing maintenance buildings that do not contribute to the integrity of the historic district and the mid-1960s housing units would be removed, and native vegetation would be restored.

The existing visitor center would be remodeled to accommodate fewer functions. It would function primarily as an assembly point for cave tours, but it would also provide office space for interpreters and maintenance space for functions that must be provided onsite. The park’s resource collection and curator’s office would remain in the visitor center. If economically feasible, minimal food service (such as vending machines or limited fast food) would be provided. Visitor parking at the existing visitor center would be reduced, and the area would be redesigned for shuttle bus access and circulation. The temporary building behind the visitor center would be removed.

Access to the new orientation/transit center would be by way of a new road built partly on private land (an easement agreement would be required). The access road would intersect the south side of the park entrance road outside the park, just west of the Whites City campground (see the Alternative 3 — Parkwide map). A new bridge would span the Walnut Canyon drainage, then the road would head southwest onto park land to the base of the escarpment. A flood hazard study would be required for this development.

A staffed visitor contact station would be provided near the Slaughter Canyon trailhead, allowing park staff to disseminate information, issue backcountry permits, monitor backcountry use, and ensure resource protection.

PARK OPERATIONS

A staffed visitor contact station would be provided near the mouth of Slaughter Canyon. This action would provide an NPS presence and increased protection and understanding of backcountry resources over the current situation. Under this alternative the National Park Service would also purchase and use natural gas powered shuttles and service vehicles, provided the costs were reasonable. This action would further reduce the potential for pollutants entering the cave, surface runoff, or atmosphere at the cave, as well as help reduce noise.

LAND USE AND MANAGEMENT

Management zoning would be the same as for alternative 2, except that the areas proposed for the orientation/transit center and its access road would be included in the subzone for other development.

PLAN IMPLEMENTATION

Phasing

Phasing for alternative 3 would be similar to alternative 2, except that relocating NPS operations away from the cavern area would be done in phase one, and providing an orientation/transit center off the escarpment and shuttle service would be done in phase two.

Costs

Construction. Construction costs for alternative 3 are estimated to be $54,100,031 (see appendix D for more detailed information).
Staffing. Alternative 3 would require an increase of 69 full-time positions over the current situation:

- Management and Administration — 3 additional positions
- Interpretation and Visitor Services — 19 additional positions
- Resource Management and Visitor Protection — 28 additional positions
- Maintenance — 19 additional positions

Twenty-three additional seasonal employees would be needed. The estimated annual budget for salaries (in 1995 dollars) for this alternative is $4,454,000.
Alternative 3
Parkwide
Carlsbad Caverns National Park
United States Department of the Interior
National Park Service

- Paved road
- Unpaved road
- Trail
- National Park Service facility
- Carlsbad Caverns National Park
- Entrance
- Cave entrance
- Waterline
- Cavern entrance area

Lincoln National Forest

Carlsbad Caverns National Park

Shuttle route

Install airlock (Alternative 3)

Provide staffed visitor contact station to monitor backcountry use

Relocate visitor orientation services (cave tour ticket sales, information, merchandise and book sales, parking). Provide shuttle service to cave area.

See Cavern Entrance Area Enlargement

Relocate park operations (headquarters, maintenance and housing functions) away from cave area

Improve old guano road trail

Improve existing road

Provide shuttle service to cave area

Improve old guano road trail

Improve existing road

Relocate park operations (headquarters, maintenance and housing functions) away from cave area

Provide shuttle service to cave area

Shuttle route

Carlsbad Caverns National Park

0 4000 8000 12,000 feet

NORTH
Move major food, reception, and merchandise sales to a new off-escarpment visitor orientation center. Redesign visitor center to accommodate shuttle buses and fewer functions.

Remove nonhistoric maintenance structures and revegetate

Move permanent employees to new off-escarpment housing

Move maintenance functions critical to visitor services to visitor center. Move others to new off-escarpment operations center

Move seasonal employees to new off-escarpment housing

Move cave resource management and non-NPS cave research workspace to new off-escarpment operations center

Move headquarters to new off-escarpment operations center and consolidate with administration

Provide shuttle-bus pick-up/drop-off area

Remove parking and trail section and revegetate

Remove nonhistoric housing and revegetate

Move interpretive staff to visitor center and remove temporary building

Alternative 3

Carlsbad Caverns National Park

United States Department of the Interior
National Park Service

DSC • July 1996 • 130 • 20.024
In the June 1993 newsletter (see “History of Planning and Public Involvement,” page 7) five alternatives were presented for public comment. Two of these original alternatives — the minimum action alternative (formerly alternative 2) and the alternative to accommodate all visitors coming to the park (alternative 5) — have been dropped from further consideration because most individual actions were being considered under the other three alternatives. Other actions that were considered during the course of this planning effort, but that were dropped from further evaluation, are described below.

The National Park Service considered the idea of accessing the transit/orientation center in alternative 3 from the existing sewage lagoon road, in effect bypassing Whites City. This idea was rejected because if visitors had to backtrack to visit Whites City to eat, shop, or spend the night, they would be less inclined to stop there. This would probably reduce the economic viability of Whites City.

Two options were considered for relocating residential or maintenance facilities: (1) move facilities to the Rattlesnake Springs unit of the park, or (2) move them to an abandoned stone quarry on the escarpment about 1 mile east of the existing cavern entrance development. The Rattlesnake Springs site was rejected because this area is a desert oasis and an important feeding and resting area for birds, bats, and other animals. Other concerns were possible adverse impacts to the existing cultural landscape and the travel time required for employees to reach the cavern entrance/visitor center area. The abandoned quarry site was rejected because on the escarpment there is always the risk that new, undiscovered caves may be present.

In response to concern that surface facilities and activities might do irreparable damage to Carlsbad Cavern, the planning team also considered removing all facilities from above the cavern, including the visitor center, elevators, historic structures, and parking. Under this scenario access to the cave would be provided by way of a new tunnel from the base of the escarpment. This idea was rejected because of new damage to the cavern and the high cost ($16 million for tunnel construction alone).

The idea of removing structures that contribute to the integrity of the Caverns Historic District was rejected because of the historic and potential interpretive value of these resources. The district is listed on the National Register of Historic Places as a valued example of rustic design, which uses materials and architecture indigenous to the local area and contributes to the traditional New Mexican historical scene (see sections on cultural resources for further details).

Other options for improving Walnut Canyon desert drive to address resource-related and maintenance problems were considered. These options and their relative merits are documented in a brief report by the Federal Highway Administration (1993).
### Table 1: Summary of Alternatives

<table>
<thead>
<tr>
<th>Management of Natural Resources</th>
<th>Alternative 1: Continue Existing Management Direction (No Action)</th>
<th>Alternative 2: Proposed Action</th>
<th>Alternative 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carlsbad Cavern</strong></td>
<td>Study visitor behavior and monitor resource damage. Test various designs, techniques, and equipment to reduce resource impacts in selected areas of the cavern, including methods to reduce major problems related to people touching or breaking formations and spreading lint from clothing. Continue to address the following impacts as funding allows: scattering of emery chips along the public trail route, lint deposition on cavern formations, vandalism of cavern formations, and contamination from discarded items. Continue ongoing infiltration/hazard study.</td>
<td>Provide increased NPS staff and deploy them more effectively to protect resources; emphasize resource protection on guided tours, with limited tour sizes. Continue monitoring cave damage in all areas; identify limits of acceptable change. Based on studies and tests of protective techniques, designs, tours, and staffing, implement a cavern use and protection plan, possibly including protective devices, more appropriate trail paving material, measures to reduce/eliminate lint, improved trail washing/catchment techniques, a more efficient and more easily maintained cave lighting system, and realigned trails for better resource protection and minimum impact. Allow no additional development of facilities over the cavern. Continue the ongoing infiltration/hazard study to determine threats to cave resources from surface activities and facilities. Based on the infiltration/hazard study, undertake a development concept plan/environmental assessment for the cavern entrance area to address impacts on and threats to cave resources.</td>
<td>Same as alternative 2, except implement the maximum feasible means to protect Carlsbad Cavern resources as soon as possible, including stringent measures to eliminate lint; relocate facilities and functions from above the cavern, except for historic buildings and the visitor center.</td>
</tr>
<tr>
<td><strong>Lechuguilla Cave</strong></td>
<td>Continue to restrict cave access to qualified research and exploration/mapping teams. Work cooperatively with state of New Mexico to develop protective measures for state-permitted wells in the Lechuguilla Cave protection area.</td>
<td>Same as alternative 1, plus the following: Rely on BLM to protect the area north of the park; cooperate with BLM in revising the resource management plan to control future oil and gas leasing. Seek funding and staffing resources to fully implement the Cave Management Plan. Provide the ability to send an NPS cave specialist with any team entering the cavern. Evaluate and possibly improve airlock/culvert at the altered entrance; provide for security and safety. Develop a restoration plan for Lechuguilla Cave resources.</td>
<td>Same as alternative 2, except require an NPS cave specialist to accompany every team entering the cave.</td>
</tr>
<tr>
<td><strong>Other Caves</strong></td>
<td>Encourage studies to collect information on the fauna of park caves.</td>
<td>Begin monitoring the effects of visitors in Slaughter Canyon Cave. Install bat-accessible gates on caves needing greater protection.</td>
<td>Same as alternative 2.</td>
</tr>
</tbody>
</table>
| **Surface Natural Resources** | **Manage surface natural resources as funding and staffing allow, in accordance with the park’s Resources Management Plan.** | Expand inventorying, monitoring, and research.  
Provide educational/outreach programs (including desert ecosystem and wilderness).  
Facilitate cooperative management of the Guadalupe Mountains ridge area with the Forest Service and BLM.  
Seek to resolve conflicting policies and practices regarding Barbary sheep.  
Alter human-made impoundments at backcountry springs after fully documenting, evaluating, and developing mitigating measures for associated cultural resources.  
Develop a comprehensive water conservation program.  
Study potential risks to groundwater from agricultural irrigation and leaking gas wells outside the park; work with neighbors to eliminate negative effects.  
Conduct a groundwater hydrological study of Rattlesnake Springs.  
Conduct studies to determine the effects of human activity on bat flights; manage visitors as needed; study ways to improve bat habitat; reintroduce bats into previously occupied caves where appropriate (additional study required); expand outreach educational programs to protect the park’s bats.  
Conduct research to determine where swallows migrate in winter; regulate light sources in the cavern to prevent swallows from nesting deeper inside.  
Expand work to contribute to national and international scientific efforts. |

| **ALTERNATIVE 2: PROPOSED ACTION** | **MANAGEMENT OF CULTURAL AND PALEONTOLOGICAL RESOURCES** | **ALTERNATIVE 3** |

| **Manage cultural and paleontological resources as required by law, and in accordance with the park’s Resources Management Plan and revised Rattlesnake Springs Management Plan.** | **Manage cultural and paleontological resources through a proactive program of inventory, evaluation, conservation, stabilization, protection and monitoring, public education, continuing research, law enforcement, interpretation, and consultation with Native Americans.** | Same as alternative 2. except provide limited adaptive use of historic buildings in the Caverns Historic District (pending the results of infiltration/hazard study and a future final decision). |

| **Continue the adaptive use of historic buildings in the Caverns Historic District for housing, office space, and storage.** | **Continue adaptive or limited adaptive use of historic buildings in the Caverns Historic District (pending the results of infiltration/hazard studies and a future final decision). Provide education/interpretation to increase visitor sensitivity to the historic/prehistoric and ethnographic human environment. Manage Rattlesnake Springs as a cultural landscape, recognizing the significance of the stream/riparian system; revise the Rattlesnake Springs Management Plan.** | |

**Summary of Alternatives**
### ALTERNATIVES, INCLUDING THE PROPOSED ACTION

<table>
<thead>
<tr>
<th>ALTERNATIVE 1: CONTINUE EXISTING MANAGEMENT DIRECTION (NO ACTION)</th>
<th>ALTERNATIVE 2: PROPOSED ACTION</th>
<th>ALTERNATIVE 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VISITOR USE</strong></td>
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<tr>
<td>Visitor Access/Carrying Capacity</td>
<td>Continue private vehicle access to parking areas near the visitor center; temporarily stop vehicle entry when the parking areas are full. Regulate entry to Carlsbad Cavern by elevator capacity and existing limits on the size of guided tours.</td>
<td>Continue private vehicle access to the three parking areas near the visitor center. Conduct a visitor experience/resource protection program to determine appropriate use levels while protecting resources. In the interim, temporarily stop entry to the park when parking areas are full; encourage visitors to come during the off-season and shoulder seasons; adjust the sizes of guided tours or tour methods as needed.</td>
</tr>
<tr>
<td>Visitor Reception and Orientation</td>
<td>Continue the existing functional arrangement in the visitor center to orient visitors to park resources and programs, and to introduce them to the primary interpretive themes.</td>
<td>Provide improved visitor orientation at a redesigned visitor center. Inform people what they can expect before they buy tickets (i.e., the logistics of the visit, what they will be able to see, and the variety of activities); provide cave tour information at a kiosk near the park entrance. Improve visitor understanding of what is necessary for a safe and low-impact experience.</td>
</tr>
<tr>
<td>Visitor Tours Inside the Cavern</td>
<td>Continue self-guided tours in the Main Corridor and the Big Room. Provide guided King’s Palace tours; during the low use season provide guided Main Corridor tours; charge additional fees for guided tours. Offer special off-trail tours by reservation (e.g., Left-hand Tunnel, Lower Cave).</td>
<td>Continue self-guided tours in the Big Room and Main Corridor, with NPS staff stationed where resources are most susceptible to damage, and where visitors are most interested in personal interpretation. Provide guided King’s Palace tours. Offer special off-trail tours by reservation (based on available staffing; could be scheduled in advance with full staffing). Continue monitoring resource damage in all areas, reserving the option to convert tours from self-guided to guided.</td>
</tr>
<tr>
<td><strong>ALTERNATIVE 1: CONTINUE EXISTING MANAGEMENT DIRECTION (NO ACTION)</strong></td>
<td><strong>ALTERNATIVE 2: PROPOSED ACTION</strong></td>
<td><strong>ALTERNATIVE 3</strong></td>
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<tr>
<td><strong>Special Interpretive Programs</strong></td>
<td>Same as alternative 1, <em>plus</em> the following: Interpret resource management issues. Improve interpretive media for Lechuguilla and other wild caves. Possibly provide an environmental education center in the present headquarters building (pending the results of the infiltration/hazard study and a future final decision). Develop a geologic interpretive trail on top of the escarpment. Provide wayside exhibits on guano mining on a portion of the old guano road near the cavern. Conduct need and feasibility studies about opening Ogle Cave to guided tours; if tours feasible, interpret historic guano mining. Provide more informative interpretive exhibits at Rattlesnake Springs.</td>
<td>Same as alternative 1, <em>plus</em> the following: Interpret resource management issues. Improve interpretive media for Lechuguilla and other wild caves. Provide more informative interpretive exhibits at Rattlesnake Springs. Sign, improve, and interpret the old guano road trail connecting Whites City to the cavern entrance area.</td>
</tr>
<tr>
<td><strong>Interpretive Staffing</strong></td>
<td>Same as alternative 1, <em>plus</em> the following: Ensure all staff (permanent and seasonal) are fully and continuously trained. Increase staff to control and monitor visitors on self-guided tours. (Also see “Visitor Tours inside the Cavern” above.)</td>
<td>Same as alternative 2, <em>plus</em> the following: Increase seasonal staff to provide more guided tours. Offer guided tours only up to available staffing levels.</td>
</tr>
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</table>

**GENERAL DEVELOPMENT / PARK OPERATIONS**

<p>| <strong>Roads, Trails, and Other Infrastructure</strong> | Same as alternative 1, <em>except</em> for the following: Improve the Walnut Canyon desert drive. Provide a primitive trail to Ogle Cave and complete the tunnel entrance (need and feasibility studies required). Decide treatment of sewer- and waterlines in the Caverns Historic District in the future development concept plan after the cavern area infiltration/hazard study has been completed. | Continue the Walnut Canyon desert drive in its existing condition: issue special permits for its use. |
| <strong>Visitor Center — NPS Functions</strong> | Redesign the interior and exterior of the visitor center to improve circulation and space utilization. Move interpretive staff out of the temporary building into the visitor center; remove the temporary building. Move some orientation and ticket sales functions outdoors to pleasant, shaded areas. Provide a shaded overlook. | Redesign the visitor center to accommodate shuttle buses and fewer functions. Move interpretive staff out of the temporary building into the visitor center; remove the temporary building. Provide additional interpretive exhibits. Provide a shaded overlook. |</p>
<table>
<thead>
<tr>
<th>ALTERNATIVES, INCLUDING THE PROPOSED ACTION</th>
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</thead>
<tbody>
<tr>
<td><strong>ALTERNATIVE 1: CONTINUE EXISTING MANAGEMENT DIRECTION (NO ACTION)</strong></td>
</tr>
<tr>
<td><strong>Visitor Center — Concessioner Functions</strong></td>
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<tr>
<td>Improve space-efficiency of concession operations.</td>
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<tr>
<td>Change food service to more efficient fast food/cafeteria/or other type service adequate to meet visitor needs.</td>
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<tr>
<td>Retain kennel and present merchandise space; ensure sales items reflect park interpretive themes.</td>
</tr>
<tr>
<td><strong>Headquarters and Administration</strong></td>
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<tr>
<td>Retain headquarters in the stone structure in the Caverns Historic District.</td>
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<tr>
<td>Retain park administrative offices in the city of Carlsbad (including administrative services for Guadalupe Mountains National Park).</td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
</tr>
<tr>
<td>Retain maintenance functions in the Caverns Historic District.</td>
</tr>
<tr>
<td><strong>Cave Resource Staff and Resource Collection Storage</strong></td>
</tr>
<tr>
<td>Retain cave resource offices in two stone structures in the Caverns Historic District.</td>
</tr>
<tr>
<td>Retain the park resource collection in the curator’s visitor center office.</td>
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<tr>
<td><strong>NPS Housing</strong></td>
</tr>
<tr>
<td>Continue to house seasonal employees in two existing dormitories.</td>
</tr>
<tr>
<td>Continue to house permanent employees in mid-1960s and adobe apartments.</td>
</tr>
<tr>
<td><strong>Other Management Activities</strong></td>
</tr>
<tr>
<td>Provide a ranger residence at the park boundary on the road to Slaughter Canyon to improve backcountry management.</td>
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<tr>
<td>Replace Putman cabin.</td>
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<tr>
<td>Consider minor boundary adjustments and land exchanges with other federal agencies that are to the mutual administrative benefit of both agencies.</td>
</tr>
</tbody>
</table>

| **ALTERNATIVE 2: PROPOSED ACTION** |
| Same as alternative 1, plus consider providing an outdoor space for eating. |

| **ALTERNATIVE 3** |
| Relocate merchandise sales and food service off the escarpment (possibly near the new orientation/transit center). |
| If economically feasible, provide minimum food service (such as vending machines or limited fast food) at the cavern visitor center. |
| Move headquarters off the escarpment and consolidate with other functions at a new NPS operations center. |
| Move administrative offices to the base of the escarpment; continue to provide administrative services for Guadalupe Mountains National Park. |
| Move most maintenance functions off the escarpment; provide janitorial, elevator mechanic, and supply storage functions at the visitor center. |
| Move cave resource offices off the escarpment. |
| Retain park resource collection in the curator’s visitor center office. |
| Provide housing for all employees off the escarpment. |
| Provide nighttime patrols at the cavern entrance and as needed for security/safety. |
| Provide a staffed visitor contact station at Slaughter Canyon to improve visitor orientation and backcountry management; issue permits for backcountry use. |
| Purchase and use natural gas powered shuttle and service vehicles. |
### Table 2: Summary of Impacts

<table>
<thead>
<tr>
<th>Impact Topic</th>
<th>ALTERNATIVE 1: CONTINUE EXISTING MANAGEMENT DIRECTION (NO ACTION)</th>
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<th>ALTERNATIVE 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NATURAL RESOURCES</strong></td>
<td></td>
<td></td>
<td>Damage to cave formations would be reduced but not eliminated. Trail realignment would damage some minor formations adjacent to the trail. Damage to Lechuguilla Cave would have a beneficial effect on the cave. Damage to Lechuguilla Cave would be reduced or reversed.</td>
</tr>
<tr>
<td>Cave Formations</td>
<td>Significant numbers of cave formations would continue to be damaged in Carlsbad Cavern, constituting an irreversible loss of resources. Lechuguilla Cave’s pristine condition would continue to be altered or destroyed. Assessment of damage in backcountry caves would be prevented. The degree of potential damage to all cave resources would increase over time.</td>
<td>The long-term impact on cave formations would be beneficial. However, some actions would be deferred pending the completion of special studies and experiments to establish a scientific basis for decisions; adverse effects during this interim period could be unavoidable and result in irreversible losses. Breakage, theft, and other damage to formations in Carlsbad Cavern would be greatly reduced. Illegal entry, damage, and theft would decrease in backcountry caves. Protection of Lechuguilla Cave would be improved, and some damage reversed.</td>
<td></td>
</tr>
<tr>
<td>Cave Processes</td>
<td>Unnatural algae growth and associated resource damage would continue in Carlsbad Cavern. Potential for hazardous materials and other foreign substances to infiltrate into the cavern and conceivably damage cave resources and processes; unknown effects of present trail materials. Dissolved oxygen in Carlsbad Cavern pools would continue to be depleted, and water pool hydrology and circulation would remain altered. Lechuguilla Cave air conditions could be altered, with unknown effects.</td>
<td>Potential effects from foreign substances and altered infiltration patterns into the cavern would be eliminated. The potential for visitors to touch formations and alter cave deposition processes would be reduced. Damage to the cave from maintenance and cleaning activities would be reduced or eliminated, and foreign materials would no longer be scattered along the trail corridor. A study of hazardous materials used and stored above the cavern (and their potential effects on cave processes in the event of an accident) would help managers decide how to prevent or mitigate adverse effects, including irreversible or irretrievable damage.</td>
<td>The risk of hazardous substances entering the cavern would be eliminated. The risk of harmful effects from decomposing hydrocarbons and contaminant dispersal during maintenance activities would be reduced or possibly eliminated. Trapping and containing motor vehicle runoff and shuttling visitors would reduce potential adverse effects on the cave.</td>
</tr>
<tr>
<td>Soils and Vegetation</td>
<td>Illegal plant collecting, human use, and maintenance activities would temporarily disturb soils and vegetation. Long-term significant adverse impacts on park soils or vegetation are not expected.</td>
<td>Increased cooperation among federal agencies; expanded research, inventory, and monitoring; better protection in backcountry areas; and increased awareness through interpretation would all have beneficial impacts on soils and especially vegetation. Overall, there would be no significant long-term adverse impacts.</td>
<td>Same as alternative 2, except existing localized impacts to soils and vegetation along the Walnut Canyon desert drive would continue over the long term.</td>
</tr>
</tbody>
</table>
## Alternatives, Including the Proposed Action

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<tr>
<td><strong>Wildlife</strong></td>
<td>Wildlife harassment, poaching, and competition between native and non-native species for forage would continue; insufficient information on bats and swallows would continue to hamper management.</td>
<td>Wildlife would benefit over the long term from expanded research, inventory, and monitoring; cooperation among federal agencies; better protection in backcountry areas; increased awareness through interpretation; and improvement of the Walnut Canyon desert drive. No significant long-term adverse impacts on wildlife species or their habitat are expected overall.</td>
<td>Wildlife would benefit over the long term from expanded research, inventory, and monitoring; cooperation among federal agencies; better resource protection in backcountry areas; and increased interpretation. Existing impacts on wildlife from the Walnut Canyon desert drive would continue. Forage and habitat for some wildlife species would be reduced by constructing proposed facilities at the base of the escarpment.</td>
</tr>
<tr>
<td><strong>Threatened or Endangered Species</strong></td>
<td>Potential for illegal collecting of threatened or endangered plant species would continue; in the worst case, such collecting could further endanger these species.</td>
<td>Some beneficial effects on threatened or endangered species due to proposed programmatic actions would be likely. Proposed actions are not likely to adversely affect proposed, threatened, or endangered species.</td>
<td>Same as alternative 2.</td>
</tr>
<tr>
<td><strong>Water Resources</strong></td>
<td>Potential for contamination of the park’s domestic water supply would continue. The risk of having inadequate water to fulfill park needs would remain, and water-related natural resources and the Rattlesnake Springs cultural landscape could be negatively affected.</td>
<td>Groundwater quality in the area would be improved. No significant negative impacts on water resources, including floodplains and wetlands, are expected.</td>
<td>Groundwater quality would be improved. Some facilities would be within the probable maximum floodplain, but no significant negative impacts on water resources, including floodplains and wetlands, are expected.</td>
</tr>
<tr>
<td><strong>Air Quality</strong></td>
<td>No long-term impacts would result.</td>
<td>Same as alternative 1.</td>
<td>Same as alternative 1.</td>
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</tbody>
</table>

### Cultural Resources

<table>
<thead>
<tr>
<th>Archeological Resources</th>
<th>Short-term adverse impacts would continue. Long-term impacts would be mostly mitigated, but some adverse effects would continue.</th>
<th>Short-term adverse impacts on archeological resources would occur until studies and measures proposed in the park’s Resources Management Plan were implemented. Long-term adverse impacts (e.g., loss of resources from looting and illegal collecting) would probably continue, but with mitigation would occur at a much lower rate.</th>
<th>Short-term adverse impacts would continue. Some beneficial effects would occur, but archeological resources would require extensive mitigation to prevent adverse impacts, and some impacts could not be entirely avoided.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Historic Resources</strong></td>
<td>Adaptive use of historic structures in the Caverns Historic District would ensure their preservation; the cultural landscape would be maintained and possibly improved. Historic resources in the cavern would be protected. Historic resources at Rattlesnake Springs would benefit from improved resource management and irrigation practices.</td>
<td>Adaptive use of historic structures and modifications to the visitor center would preserve historic structures and have a beneficial effect on the surrounding landscape. Historic resources in the cavern would be protected. Impacts from opening Ogle Cave to visitation would be mostly mitigated. Historic resources at Rattlesnake Springs would benefit.</td>
<td>This alternative could have negative impacts on historic structures, adversely affecting the historic setting and the cultural landscape in the Caverns Historic District. Historic resources at Rattlesnake Springs would benefit.</td>
</tr>
</tbody>
</table>
### Summary of Impacts

<table>
<thead>
<tr>
<th>IMPACT TOPIC</th>
<th>ALTERNATIVE 1: CONTINUE EXISTING MANAGEMENT DIRECTION (NO ACTION)</th>
<th>ALTERNATIVE 2: PROPOSED ACTION</th>
<th>ALTERNATIVE 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Museum Resources</td>
<td>In the short term, the management of artifacts, specimens, and archival resources would be uneven and sporadic. Over the long term, such resources would be curated to minimum standards.</td>
<td>Artifacts, specimens, and archival resources would be better protected and managed because of improved storage conditions and additional staff.</td>
<td>Same as alternative 2.</td>
</tr>
<tr>
<td>Ethnographic Resources</td>
<td>Consulting with culturally affiliated groups would positively affect the preservation of ethnographic resources over the long term.</td>
<td>Same as alternative 1.</td>
<td>Same as alternative 1.</td>
</tr>
<tr>
<td>Paleontological Resources</td>
<td>Cave exploration and unauthorized collecting would continue to threaten paleontological resources.</td>
<td>Some damage to paleontological resources from cave exploration and unauthorized collecting would continue. Overall, these resources would benefit from better identification and management, and long-term negative effects would be minimized.</td>
<td>Same as alternative 2.</td>
</tr>
<tr>
<td>Visitor Experience</td>
<td>Cave Access and Circulation</td>
<td>Except during a few peak days, visitors desiring a cave experience would be accommodated and could choose between several guided or self-guided tours. The potential for additional cave resource damage would continue and could affect visitors' enjoyment of the cavern.</td>
<td>Except for a few peak days, all visitors desiring a cave experience would be accommodated and could still choose between guided or self-guided tours. The increased emphasis on guided tours of sensitive areas, plus additional security measures in the Big Room, would result in less cave damage being apparent to visitors.</td>
</tr>
<tr>
<td></td>
<td>Information, Orientation, and Interpretation</td>
<td>Some opportunities would continue to be provided for visitors to get information and orientation about Carlsbad Caverns and other regional attractions, but visitors might not find out about some opportunities. Existing exhibit space inefficiencies, crowding, and gaps in interpretation would continue to compromise visitors' experiences.</td>
<td>On a regional level opportunities for visitors to get current, accurate information and become oriented to Carlsbad Caverns and other tourist attractions would be increased. Visitors would be well prepared to enjoy the park in an efficient, safe, and environmentally conscientious manner. Visitors would be able to gain significant understanding and appreciation of the park resources.</td>
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<td></td>
<td>Scenic Quality</td>
<td>Scenic quality atop the escarpment would not be greatly improved, and visitors would still have difficulty finding suitable places to enjoy long-range landscape views.</td>
<td>Visual quality near the cavern entrance / visitor center area would be improved with a redesigned visitor center. Opportunities for visitors to see panoramic views would be significantly improved. Constructing a ranger residence near the mouth of Slaughter Canyon would intrude on visual quality in this area.</td>
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### Alternatives, Including the Proposed Action

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<tr>
<td>Safety</td>
<td>Danger from flash floods would be reduced, but danger to persons in the cavern from a hazardous material spill or leak in the park maintenance area would remain.</td>
<td>Safety of visitors, park staff, and others would be improved overall.</td>
<td>Safety of visitors, park staff, and others would be the greatest of any alternative.</td>
</tr>
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### Socioeconomic Impacts

<table>
<thead>
<tr>
<th></th>
<th>Alternative 1: Continue Existing Management Direction (No Action)</th>
<th>Alternative 2: Proposed Action</th>
<th>Alternative 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>No short-term change in ongoing socioeconomic impacts is expected, unless the cavern had to be closed indefinitely for public safety reasons. Over the long term, continued degradation of resources would lessen the quality of visitor experiences and could negatively impact the local tourism industry.</td>
<td>The local economy would benefit over the both the short and long term, provided hazardous materials or other effects did not result in a closure of the cavern before such risks could be eliminated. The local tourism industry would be enhanced because park resources would be better protected and visitor experiences enhanced.</td>
<td>Same as alternative 2 except that economic benefits to the local economy would be reduced somewhat, at least in the short term.</td>
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</table>
Chandelier formations, Lechuguilla Cave
Carlsbad Caverns National Park and the surrounding region are comprised primarily of spacious desert areas. The park preserves one of the few protected portions of the northern Chihuahuan Desert ecosystem. From deeply incised uplands within the park, the land slopes into plains and low hills to the south and east, and then gradually rises toward the southwest to form the crest of the rugged Guadalupe Mountains of northwestern Texas.

GEOLOGY

The Guadalupe Mountains are composed primarily of weathered limestone and dolomite with small amounts of sandstone. The mountains are an uplifted, eastward-tilting block of an ancient barrier reef, which is highest on the west and forms a steep, faulted escarpment, referred to as the Capitan Reef complex. The Capitan Reef was formed during the Permian period and attracts geologists from throughout the world for research and study. Deep, scenic canyons in the park have eroded through the reef, leaving exposed cross sections that provide windows into this geologic period. The north side of the block recedes down into the surrounding plains, while the east side subsides into the plains near Carlsbad, New Mexico. This complex contains most of the large caves of the Guadalupe Mountains, including Carlsbad Cavern and Lechuguilla Cave.

Cave Formation

The Capitan Reef complex is considered one of the world’s finest examples of exposed ancient barrier reefs. The reef complex formed on the shallow edge of an inland sea during the warmer, temperate Permian period (280–250 million years ago). The barrier reef formed a lagoon where ancient marine plants and animals were deposited in sediment layers, becoming a calcium carbonate structure of the Capitan limestone and Goat Seep dolomite reefs. (See Kelley 1971, Hayes 1964, and Jagnow and Jagnow 1992 for a more detailed description.) Exposed limestone and dolomite constitute a distinctive karst topography characterized by closed sinkholes, caves, and underground drainages because limestones and dolomites tend to dissolve fairly easily. Karst areas in several large regions of the United States are crucial to the process of filtering and storing underground water.

Limestone caves are created by an acid solution that dissolves the soft limestone. Most limestone caves in the world were formed by a solution of carbonic acid seeping downward through cracks and joints and gradually dissolving the rock and enlarging the cracks into passages. Some smaller portions of the caves in the Capitan Reef complex undoubtedly were formed by this process.

However, in the Capitan Reef complex, it is likely that sulfuric acid was the primary dissolving agent and created huge chambers (Hill 1990). Sulfurous gases, seeping upward from below, oxidized to sulfuric acid and dissolved the calcium carbonate along the fractured faults, joints, and bedding plains (partings). The acid slowly enlarged the narrow cracks and fissures into corridors, passages, and large caverns. As the reef continued to rise, the groundwater subsided and air filled the chambers. As this happened, large pieces of rock in these caves were no longer supported by water and collapsed to the cavern floors.

Carlsbad Cavern and Lechuguilla Cave, as well as other caves in the Capitan Reef complex, are notable for their immense sizes. Most of the caves are highly decorated with large, beautiful features formed by secondary deposition (stalactites and stalagmites, for example), which are commonly called speleothems. A few types of speleothems in the park are not known elsewhere in the world.
Speleothem formation began after the water subsided, the chambers filled with air, and carbonic acid seeped downward, dissolving tiny bits of limestone. When the acid-laden droplets reached the chambers, carbon dioxide was released, reducing the acidity and the capacity of the water to retain its calcium carbonate in solution. A minuscule amount of new limestone was then deposited on the ceiling, wall, or floor of the subsurface chamber, drop by drop. The growth rate of these speleothems is variable, depending on water supply, flow rate, acidity, and other dissolved minerals in the water. Speleothems of gypsum and sulfur are related to deposition by sulfuric acid, and Lechuguilla Cave likely contains the world’s most spectacular examples of speleothem formation by this unusual process.

The varieties of speleothems in the park appear to be countless. Stalactites, stalagmites, columns, soda straws, cave pearls, gypsum flowers, draperies, hydromagnesite balloons, helictites, and aragonite crystals are just a few of the speleothems associated with the caves of the Guadalupe Mountains and Carlsbad Caverns National Park.

**Park Caves**

**Carlsbad Cavern.** Carlsbad Cavern is one of the world’s largest caverns by volume, and it is considered one of the most adorned with speleothems. From the natural entrance the paved trail drops about 830 feet (250 m) through the Main Corridor into the King’s Palace area, which includes the Green Lake Room, the King’s Palace, the Queen’s Chamber, and the Papoose Room. The trail inclines upward to the elevator area at approximately 750 feet (225 m) below the visitor center.

The Big Room is one of the largest underground chambers in the world. The cross-shaped cavern measures 1,800 feet (550 m) in length, up to 1,100 feet (336 m) wide, and 255 feet (69 m) at its highest point.

Formations such as the Whale’s Mouth, the Temple of the Sun, Giant and Twin Domes in the Hall of Giants, the Lion’s Tail, Painted Grotto, Green and Mirror Lakes, and examples of various speleothems are world-renowned.

**Lechuguilla Cave.** About 4 miles (6.5 km) north of the Carlsbad visitor center is Lechuguilla Cave. Named after a native species of spiny agave, Lechuguilla Cave was mined for guano in the early 20th century, and maps indicated less than 300 feet (98 m) of passage. However, cavers in the 1950s noted wind blowing out through a rubble slope, possibly concealing the entrance to a much larger cavern. In 1986 a short connection tunnel was excavated through the rubble pile to reveal an entrance to larger portions of the cave.

Lechuguilla Cave is the deepest known limestone cave in the United States, and it contains some of the most spectacular formations in the world: subaqueous helictites found nowhere else, rare hydromagnesite balloons, 20-foot-long gypsum chandeliers and gypsum hairs, 15-foot-long soda straws, and unusual gypsum crystals, flowers, and crusts. Grand passageways, rooms, and formations have been discovered, and volumes of air entering and leaving the cave during periods of barometric change outside indicate that much of the cave is still unexplored.

Recently, rare chemosynthetic bacteria and obligate fungi, which derive energy from gypsum, magnesium, and iron deposits, have been discovered in the cave. These are believed to have a role in cave formation. These and other rare scientific phenomena, combined with the pristine conditions of Lechuguilla Cave, provide an unprecedented opportunity to study natural cave processes and cave climate. The cave is within a designated wilderness area and has no human developments such as buildings, utilities, or roads above it to alter cave processes.

Lechuguilla Cave may be connected to other known caves outside the park boundary, such as Big Manhole Cave (see the following section on
caves outside the park). Over 89 miles of passages have been discovered and mapped. Exploration and surveying continues, and much of the cave remains to be documented (Lechu­guilla is one of the most physically demanding wild caves in the United States to explore and survey). Currently, surveyed passages extend within about 600 feet (183 m) of the north boundary of the park. Lechuguilla is closed to recreational caving; entry is permitted only for exploration and mapping, limited documenta­tional photography, and research in such fields as cave mineralogy, microbiology, biology, and paleoclimatology.

**Slaughter Canyon Cave.** Slaughter Canyon Cave (formerly New Cave or New Slaughter Cave) is one of the larger caves in the park. It is about 8.5 miles (9.5 km) southwest of the visitor center, just within the mouth of Slaughter Canyon, on its west side. The hillside above the site is an important geological area of the forereef and related fossils.

The cave is about 1.75 miles (2.6 km) long. It consists of a main corridor approximately 1,170 feet (357 m) long, with cross sections up to 220 feet (67 m) wide. It is characterized by large rooms with arched ceilings, and parts are highly decorated with spectacular speleothems, including an 89-foot (27 m) column.

**Ogle Cave.** Ogle Cave is part of an inter­connected two-cave system consisting of Ogle and Rainbow Caves. Each cave formed independently, and they are connected by a tight joint passage called Blood Fissure. Ogle Cave is high on the east side of Slaughter Canyon, across from Slaughter Canyon Cave.

The Ogle Cave portion of the system is primarily composed of one large linear-shaped passage about 1,500 feet (488 m) long and averages about 100 feet (30 m) in height and width — one of the larger chambers in the park. Present entry to Ogle requires a 180-foot (59 m) technical descent on ropes through a naturally occurring vertical passage.

Like most caves of the Guadalupe Mountains, Ogle Cave is decorated with large speleothems. The cave contains massive stalactites, stalagmites, draperies, flowstone, bell canopies, and The Bicentennial column (one of the world’s tallest at 106 feet). Smaller speleothems such as shields, rimstone dams, cave pearls, helictites, popcorn, and rafts occur. Almost all the speleo­thems are inactive because of the dry surface climate.

**Backcountry Caves.** Currently, 84 caves are known within park boundaries. The number has nearly tripled since 1972 because of efforts by the park staff and volunteers to locate and document previously unknown caves. Ten back­country caves are open to cavers with NPS perm­its. The volume and length of passages vary, and several of the park caves may be intercon­nected; there is also a high probability of inter­connections with caves outside the park.

**Caves Outside the Park**

There are more than 120 known caves in the Guadalupe district of Lincoln National Forest. Most are along Guadalupe Ridge just west of the park. Cottonwood Cave is one of the most prominent and has large formations, a massive entrance, nearly 3 miles of passages, and gypsum deposits in the form of flowers and hanging chandeliers of exceptional beauty. Other caves include Virgin Cave, Three Fingers Cave, Black Cave, Hell Below Cave, and Madonna Cave.

The 1986 Lincoln National Forest Plan states the management direction is to “preserve and protect cave resources to provide a wild caving experience and to provide quality information and interpretive services related to this unique re­source.” The U.S. Forest Service has one staff member for cave research, resource manage­ment, and protection, and does not have a specific cave management plan. The Forest Service permits cave entry for recreation and research.
The BLM’s Dark Canyon special management area is contiguous to the park’s northern boundary, and several well-known caves are within the Lechuguilla Cave protection area just north of the park. Big Manhole Cave, about 1.25 surface miles from the entrance to Lechuguilla, contains outstanding deposits of paleontological materials. Measured airflow suggests a possible connection with Lechuguilla Cave. Other significant caves include Mudgetts Cave and Snake Trap Cave, both of which are close to the park’s northern boundary.

The BLM’s cave management principle is to manage cave resources “in a manner which emphasizes long-term protection of rare and significant values that have local, regional, national, and international importance. Cave management will range from total protection of the highest resource values to forfeiture of low value resources whose protection would unjustifiably conflict with other beneficial uses” (BLM 1988). Permits for cave entry are issued for research and recreational uses. The Roswell district has two staff positions for cave research, resource management, and protection.

**Oil and Gas Potential**

The Permian Basin, a geologic basin containing Guadalupe Mountains and Carlsbad Caverns National Parks, is an abundant source of commercially important oil and gas (Ward et al. 1986). Many of the hydrocarbon accumulations also contain poisonous hydrogen sulfide.

Oil and gas production occurs in several geologic zones, including the Goat Seep, Grayburg, Queen, Seven Rivers, and Yates formations. Older rocks, especially in Pennsylvanian-age Morrow sandstone at about 10,000 feet (3,050 m), lie beneath Carlsbad Caverns National Park and are also sources of oil and gas outside park boundaries.

There are hundreds of producing gas and oil wells north, east, and south of the Guadalupe Mountains and Carlsbad Caverns National Parks. Exploratory wells have been drilled within a few thousand feet of the north and east boundaries of Carlsbad Caverns.

Some exploratory wells near the park boundary have encountered voids at the same depth as major passages in Lechuguilla Cave. At least 61 wells drilled near the park have penetrated voids or lost circulation zones in the Capitan/Goat Seep formations (NPS 1993c), suggesting that unexplored cave passages have been intersected during drilling.

The area immediately north of the park boundary has substantial hydrocarbon reserves and known cave resources. Because of probable interconnections with park caves, resources inside the park could be at risk of contamination from toxic and flammable gases and other substances associated with exploration or the extraction of oil and gas.

In 1993 the National Park Service convened a panel of geologists who are familiar with caves and geology in the Carlsbad region. The panel considered the various risks of contamination to caves within Carlsbad Caverns National Park from toxic and flammable gases and other substances associated with oil and gas drilling and production, and it identified appropriate protective measures. This panel produced a “Report of the Guadalupe Caverns Geology Panel to the National Park Service.” The principal conclusion is that there is no way to protect the cave resources of Carlsbad Cavern National Park without establishing a cave protection zone along the northern boundary.

More detailed information about hydrocarbon reserves and oil and gas production potential is given in the Final Dark Canyon Environmental Impact Statement (BLM 1993) and “Report of the Guadalupe Caverns Geology Panel to the National Park Service” (NPS 1993c).
SOILS

Limestone and occasionally sandstone are exposed over much of the Guadalupe Ridge, and soils within the park are generally thin and are mostly derived from limestone. The deepest soils are in the bottoms of drainages and along the base of the escarpment. The immature residual soils of the Guadalupe area are quite stable, resisting downward movement. The canyon terraces have alluvial gravel floors, such as that found in Slaughter Canyon. Eastward from the escarpment the gravel-covered plain is composed of alluvial fans or bajadas and terraces that have been cut as deep as 75 feet. A 1964 soil map of the park by the Soil Conservation Service (SCS) identifies most of the mountain areas as limestone outcroppings, with slopes exceeding 25% and in some places approaching vertical.

The soils in the park are described as suitable for facility development (SCS 1971), including buildings, roads, or recreational facilities. However, soils in the vicinity of the proposed ranger residence near the mouth of Slaughter Canyon might not be suitable for a septic system.

About 97% of Eddy County is used for grassland/range, and the remaining 3% for irrigated crops. The irrigated tracts are generally at the lower elevations along the Pecos and Black Rivers and include a portion of the Rattlesnake Springs unit of the park — the only park land designated as suitable for irrigated crops (SCS 1971).

WATER RESOURCES

Water is scarce within the park, and there are no permanent surface streams. Surface flows usually occur as a result of summer or fall thunderstorms, when washes are prone to sudden, relatively large flows. Watersheds drain primarily south and east from Guadalupe Ridge. The general drainage pattern is between ridgelines, and the main drainages within the park are Walnut Canyon, Slaughter Canyon, Rattlesnake Canyon, and Double Canyon, plus many minor canyons. Water flows into the natural entrance of Carlsbad Cavern and down Bat Cave Draw.

Safety hazards in areas prone to flash floods can be avoided by not using sites within confined valleys or on unstable alluvial fans. Each location being considered for future development in Walnut Canyon and Slaughter Canyon contains many flood-safe areas. Walnut Canyon Creek and several ephemeral tributaries should not be encroached on by development. At Slaughter Canyon the stream channel releases water onto a relatively steep alluvial fan. Suitable sites for development exist on the fan margins and on hillsides off the fan.

Rattlesnake Springs is an important oasis in the Chihuahuan Desert landscape for both humans and wildlife. The Park Service acquired the springs in 1934 to provide a reliable water supply for cavern area facilities, and a pipeline was completed to the top of the escarpment in 1935. (Previously Oak Springs had been the source of water for park development.) A well at Rattlesnake Springs supplies water to the pipeline.

Water from Rattlesnake Springs is also used to irrigate the Rattlesnake Springs developed area and orchard and picnic area, as well as private lands on the adjacent Washington Ranch. NPS water rights for irrigation and municipal purposes are described in a 1960 U.S. District Court decision and are senior to those of Washington Ranch. The Park Service monitors diversions from the springs.

In the early 1960s water flow in the park’s backcountry springs and seeps was monitored annually. At that time 10 permanent springs, 12 permanent seeps, and 6 intermittent seeps were recorded; about half of these water sources had been developed for early ranching and guano mining operations, and there are still remnants of earth or metal tanks, check dams, and catchment basins. In 1993, 47 seeps and springs were inventoried in the park, approximately 20 of
AFFECTED ENVIRONMENT

which are permanent water sources (including Oak Springs) and are critical to wildlife.

Water Quality

The park’s domestic water supply originates from an underground aquifer southeast of the escarpment and 6 miles south of Carlsbad Cavern. Hydrologists state that Rattlesnake Springs is below the confluence of two aquifers, which merge in a Y shape, and that mixing of these sources can vary considerably.

The aquifer is susceptible to contamination from leaks in gas wells in and near an underground natural gas storage plant less than 3 miles west of Rattlesnake Springs. Leaks into nearby aquifers have contaminated other private water wells 2 miles west of the spring.

The water from Rattlesnake Springs is currently within the recommended limits of the 1982 Public Health Service drinking water standards, as adopted and amended by the Environmental Protection Agency. Due to the potential for contamination by local oil and gas wells, biweekly testing is done for hydrogen sulfide.

Floodplains

Low-level, reconnaissance-type floodplain maps were prepared for Walnut Canyon by the Federal Insurance Administration in 1978. Preliminary flood hazard assessments were completed for Walnut Canyon, Slaughter Canyon, and Rattlesnake Springs in 1992. NPS floodplain management guidelines specify that development in the regulatory floodplain be avoided to the extent possible. In most cases the regulatory floodplain is the 100-year floodplain, but in flashflood areas it is the “probable maximum floodplain.” A probable maximum flood is that considered to be the largest in magnitude possible for a site.

Walnut Canyon, the site of about 5 miles of the park’s paved entrance road and the easternmost portion of the scenic desert drive, has flooded occasionally over the past several decades, with each flood lasting for up to several hours. Heavy thunderstorms could cause problems for visitors on the Walnut Canyon desert drive because of the numerous streambed crossings; consequently, the road is closed with steel gates at each end of the scenic drive during storms.

Existing facilities at the Slaughter Canyon trailhead consist of two vault toilets, a 25-car gravel parking lot, a small information kiosk, and an access road. A maximum flood in Slaughter Canyon could destroy existing as well as proposed development. The trail to Slaughter Canyon Cave, the proposed Ogle Cave trail, and some sections of primitive hiking/horse trails could be cut off by flooding. In the lower reaches of Slaughter Canyon wash, flooding on one road crossing outside the park near Rattlesnake Springs has stopped traffic in the past. Adequate signing by the county is needed at this crossing.

There is no flood hazard potential at the Rattlesnake Springs unit due to a large berm in the pasture area west of the springs; this berm, which was built in the 1960s, blocks the major channel into the area from the north.

All proposed development sites, except for the expanded information kiosk at the Slaughter Canyon trailhead, are proposed for areas determined to be outside the probable maximum floodplain. The proposed access road to the orientation/transit center in alternative 3 would cross Walnut Canyon Creek and Bat Cave Draw on a new bridge.

Wetlands

Park wetlands, including the Rattlesnake Springs unit, have been mapped by the U.S. Fish and Wildlife Service as part of its National Wetlands Inventory program. These maps identify Oak and Rattlesnake Springs as wetland habitat, and these
areas are classified as “palustrine persistent emergent wetlands, temporarily flooded” and “palustrine, forested, broad-leaved deciduous wetlands, temporarily flooded” (terminology follows U.S. Fish and Wildlife Service, Cowardin et al. 1979). Due to the small scale of these maps, onsite investigation of wetland/upland boundaries would be required for all but the most general planning purposes.

In 1993 the Park Service completed a preliminary wetlands determination for Rattlesnake Springs. No additional unmapped wetlands were identified there. Recommendations from that reconnaissance have been considered in the proposals for Rattlesnake Springs (see appendix C).

Over the years the 4,000-foot-long stream and wetland system at Rattlesnake Springs has been sustained by the remaining undiverted springflow. Historically this water flowed toward the Black River and Pecos River drainages, most likely creating a short, permanent stream. However, over time the stream/wetland system has undergone several changes, including development of the spring, surface water diversion, groundwater withdrawals, pre-1943 straightening of the channel, leveling of the duck pond levee in the 1950s, grading and development of terraces for agriculture, and invasion by some nonnative species. After 1972 water from the wetland ceased flowing into the Black River, and no trace of the natural channel remains at its confluence with the Black River. Remnant hydric soils underlying the area indicate the original extent of wetlands.

**AIR QUALITY**

Air quality is an important resource that directly affects the visitor experience. The Clean Air Act (42 USC 7401 et seq.) was amended in 1977 to, among other things, preserve, protect, and enhance air quality in national parks, wilderness areas, and other nationally significant areas. Carlsbad Caverns National Park was designated as a mandatory class I clean air area, placing the most stringent constraints on the construction or expansion of stationary sources of air pollution that emit more than 100 tons of pollutants per year in the vicinity of the park. The National Park Service has a responsibility to protect the park’s air quality related values, including visibility, plants, animals, soils, water quality, cultural objects and structures, and human health. The 1990 amendments to the Clean Air Act retain and enhance the provisions relating to parks and wilderness areas.

Carlsbad Caverns National Park is within the Pecos-Permian Basin intrastate air quality control region in New Mexico. As of October 1994 this region attained and is maintaining the national ambient air quality standards for particulate matter, sulfur dioxide, nitrogen dioxide, ozone, carbon monoxide, and lead. Air quality monitoring is conducted in nearby Carlsbad, Artesia, Atoka, Eunice, Hobbs, Jal, Lovington, Monument, and Roswell, New Mexico, as well as in Pyote and Odessa, Texas. Pollutants monitored at those sites include total suspended particulates, fine particulates, sulfation rate, sulfur dioxide, hydrogen sulfide, nitrogen dioxide, hydrocarbons, ozone, and carbon monoxide. Meteorological parameters (e.g., temperature, wind speed, and wind direction) are also measured.

Visibility and ambient air quality monitoring equipment was installed at Carlsbad Caverns in 1978; this monitoring equipment was moved to nearby Guadalupe Mountains National Park in 1987. After establishing baseline data, the ozone monitor was removed in October 1992. Data obtained at Guadalupe are representative of both parks.

Section 169A of the Clean Air Act, as amended, establishes a national goal of remedying existing impairment and preventing future visibility impairment in class I areas that results from anthropogenic sources of air pollution. The park has identified the views south and west from the visitor center toward the Delaware Basin and the Capitan Reef escarpment as worthy of protection;
however, visibility protection is not limited to only these views.

The U.S. Department of the Interior has certified to the Environmental Protection Agency that visibility is being impaired in both parks by uniform haze rather than by a specific source or small group of sources. However, regulations to reduce or eliminate regional haze have yet to be established. The 1990 Clean Air Act amendments require federal agencies (including the National Park Service) to conduct research and studies regarding sources of visibility impairment in class I areas and to recommend appropriate measures to remedy adverse impacts (including regional haze).

According to December 1993 data, there are 111 major emitting facilities within a 100-mile radius of Carlsbad Caverns, including power plants, potash processing facilities, gas plants, gas compressor stations, oil refineries, oil wells, portland cement plants, a steel mill, and a tepee burner. The most recent data submitted to state regulatory agencies as a requirement of their operating permits indicated that these facilities were permitted to emit 118,534 tons of sulfur dioxide, 19,994 tons of carbon monoxide, 13,108 tons of volatile organic compounds (precursors of ozone), 9,323 tons of nitrogen dioxide (another ozone precursor), and 819 tons of fine particulates.

These significant emissions may help explain visibility reduction at the park. The sulfur dioxide and nitrogen dioxide emitted by various facilities are chemically transformed into sulfates and nitrates, which are the major anthropogenic causes of reduced visibility.

VEGETATION

Native Species

As part of the northern Chihuahuan Desert vegetation zone, the park’s vegetation consists mostly of shrub and grassland, with approximately 750 plant species. Desert shrub occurs at the lower elevations, particularly in the southern and eastern portions of the park. Common species include sotol, creosote bush, redberry juniper, white-thorn acacia, prickly pear, tarbush, lechuguilla, ocotillo, catclaw mimosa, muhly grass, grama grass, and tridens grass.

Most of the remainder of the park is grassland/shrub vegetation, primarily at higher elevations and on north-facing slopes. Common species include sacahuista, sotol, oak, ceanothus, mahogany, lechuguilla, New Mexico agave, catclaw mimosa, skeletonleaf goldeneye, threeawn grass, lovegrass, and muhly grass. (The major vegetation types found in the park are mapped in the park’s 1992 Fire Management Plan.)

On several ridgetops at the highest elevations (mostly in the southwestern third of the park) are small pockets of juniper woodland. The common trees are alligator juniper, Douglas-fir, and ponderosa pine. The understory in these areas is similar to that in the grassland/shrub.

Vegetation changes have occurred from trespass grazing and from fire in historic times. Since 1987 all but a few miles of the park boundary have been fenced, thus virtually eliminating trespass grazing and allowing more natural vegetative conditions to return.

Nonnative Species

To date, 12 known nonnative plant species occur in the park. Russian olive trees and salt cedar (Tamarisk sp.) trees are present at Rattlesnake Springs both within and outside the historic district. Other nonnative vegetation within the boundary of the historic district includes fruit trees and ornamental trees and shrubs. Some of the more common nonnative plant species in the park include Johnson grass, tree of heaven, common horehound, and yellow star thistle. The latter two species especially have the potential to spread and displace native plants. The yellow star
thistle has the potential to become abundant along park roadways.

Control of nonnative plants has thus far consisted of inventories followed by hand pulling. (See appendix E for additional information on nonnative species.)

Vegetation at Proposed Development Sites

Portions of proposed development sites were initially surveyed for plants in 1993. Common species are listed below.

Slaughter Canyon. Dominant species in the area of the proposed ranger residence (alternative 2) are whitethom and tobosa grass; less dominant species include littleleaf sumac, mesquite, soaptree yucca, broom snakeweed, juniper, catclaw, agarito, croton, and hairy grama. At the site of the proposed information kiosk/staffed visitor contact station (alternative 3) dominant species include muhly grass, slim tridens, and hairy grama; other species are skeletonleaf goldeneye, sotol, mariola, Mormon-tea, dalea, lechuguilla, cloak fern, three awn, hairy tridens, and side-oats grama.

Base of the Escarpment. Dominant species in the area identified for relocating NPS operations (alternative 3 and possibly alternative 2) are whitethorn, creosote, broom snakeweed, three awn, and black grama plants. Other species are javelina bush, wolfberry, skeletonleaf goldeneye, cholla, allthorn, torrey yucca, prickly pear, lechuguilla, Mormon-tea, feather dalea, milkwort, strawberry and rainbow cactus, fluffgrass, side-oats and hairy grama, and tobosa grass.

The area identified for an orientation/transit center (alternative 3) includes whitethorn, mariola, creosote, and three awn. Less dominant species are broom snakeweed, lechuguilla, cholla, prickly pear, javelina bush, blue grama, black grama, slim tridens, and rainbow cactus.

WILDLIFE

Native Species

Cave Species. Several insect species are the only macroscopic life native to caves in the park. Most insect species, such as cave crickets, are found near bat roosts and along visitor use corridors where artificial food sources abound. There is little or no food supply within caves for large wildlife species, and there are no running streams to support fish or amphibians.

Microorganisms. Some of the park’s oldest inhabitants are vast populations of microscopic bacteria and fungi that have inhabited the stable, totally dark cave environments for hundreds of thousands, if not millions, of years. Evidence for this is found today in Lechuguilla Cave, where a bizarre variety of fossilized forms, or biothems, are preserved throughout the cave; this is a unique collection of speleothems.

Recent research in Lechuguilla Cave has also found unusual microbes in pools and in hydroaerosols in the cave air; suspected lithotrophic bacteria that may derive metabolic energy from sulfur, manganese, and iron; and novel ecosystems dependent on these bacteria. Ongoing research is not only seeking to more fully understand these rare and fragile features and how they are formed, but is also looking into potential medical applications of knowledge gained by studying the microbes. Over 1,000 strains of microbes from the pools, soils, speleothems, corrosion residues, and sulfur deposits of Lechuguilla Cave have been isolated thus far.

Bats and Cave Swallows. A large colony of about one million Mexican free-tailed bats resides in Carlsbad Cavern for approximately seven months a year. Bat Cave, just inside the cavern entrance, is the only section of the cavern known to accommodate free-tails. The cavern is world renowned for its nightly summer exodus of hundreds of thousands of bats. In a matter of minutes the bats spiral out of the cave’s natural
AFFECTED ENVIRONMENT

entrance and disperse towards the Pecos River and Black River valleys to feed on insects. The process reverses just before dawn when the bats reenter the cave to roost.

Mexican free-tailed bats are migratory, and each spring millions move north from Mexico, many to Carlsbad Caverns National Park. The bats use dry, dome-shaped rooms for roosting, birthing, and nursing young. Many female bats gather in the maternity roost to bear and raise their single offspring. Bats hang upside down, and the nursery provides roosting areas with up to 300 individuals per square foot. The young bats, if they survive, reach flight size by late summer and return with the adults to Mexico in the fall.

There is concern that visitor and vehicle activity could be affecting the evening bat flight. Bat flight changes due to loud noises, camera flashes, and amphitheater overcrowding have been recorded. The sumer population of free-tailed bats was estimated in excess of 8 million in 1936. The population declined to as low as 218,000 in 1973; the widespread use of chemical pesticides, such as DDT, and habitat loss were suspected as the primary causes of the decline. During the last decade or so, the population has fluctuated between 500,000 and 1 million bats or more.

In addition to the Mexican free-tailed bat, 15 other bat species live in the park, and two extinct species may have inhabited park caves in prehistoric times. No federally protected bat species are known in the park. The pocket free-tailed and the big free-tailed bat are occasionally found in some park caves. The fringed Myotis and the California Myotis are common, along with Townsend’s big-eared bat and western pipistrel. Several migrant species, for example, the Yuma, cave, small-footed, and long-legged bats, have been infrequently documented within the park. Also rarely recorded are the pallid bat and big brown bat. The silver-haired, red, and hoary bats are tree dwellers and are rarely found in caves. Like the Mexican free-tailed bats, most of the other bat species are seasonal residents, wintering south of the U.S. border.

Since the mid-1960s cave swallows have been roosting in mud nests in the twilight area just inside the entrance to Carlsbad Cavern. These birds spend much of their time circling near the entrance during the day and are often mistaken for bats. The nesting colony has increased steadily, and the current population is estimated at 3,000 birds. Population increases have led to the expansion of nesting locations deeper into the cave’s twilight zone. This population of cave swallows is one of the most intensely monitored in the United States. Volunteer work at Carlsbad has resulted in over 10,000 cave swallows being banded, weighed, sexed, aged, and released, but much of the data have yet to be entered into a database and analyzed. Little is known about the migration routes and winter range of this species. The Carlsbad Cavern nesting group represents one of the largest populations in the United States and is apparently at the northern limit of its range. The swallows are known to nest in at least seven other caves in the park.

Surface Species. The park’s surface wildlife species include some 331 species of birds, 64 species of mammals, and 44 reptile and amphibian species.

Large ungulates include mule deer and elk. Large mammal predators native to the area include coyote, mountain lion, and gray fox. Many other mammals, including squirrels, porcupines, ringtails, raccoons, badger, javelina, rabbits, skunks, weasels, and numerous species of mice and bats are also present.

Bird species that use, migrate through, or nest in the park (including the Rattlesnake Springs unit) include hawks, ospreys, kites, vultures, falcons, owls, nighthawks, ring-tailed pheasants, wild turkeys, bobwhites, quail, and rails. Other bird life, including grebes, herons, ibis, swans, geese, wading and diving ducks, sandpipers, woodpeckers, flycatchers, swallows, warblers, vireos, and hummingbirds, are sometimes found in the small, lush riparian habitat at Rattlesnake Springs. Reptiles, amphibians, and several fish species also use this site. Formal wildlife surveys
for the stream and wetland system have not yet been conducted.

Rattlesnake Springs provides habitat for some species found nowhere else in the United States (for example, the Texas emperor butterfly) and is recognized as one of the outstanding bird-watching sites in the New Mexico / west Texas region. Nearly 300 species have been observed, and it is the only nesting site in New Mexico for the eastern bluebird. An estimated 90% of New Mexico’s population of Bell’s vireo nests at the site. Thirty-five of the 40 species of U.S. woodland warblers also use the stream/wetland area.

Species extirpated from Carlsbad Caverns National Park include Montezuma quail, black-tailed prairie dog, gray wolf, pronghorn, bison, and bighorn sheep.

Nonnative Species

The presence of a breeding population of nonnative Barbary sheep or Aoudad (*Ammotragus lervia*) poses a serious threat to endemic wildlife species. Barbary sheep are highly adaptable in their food selection, and they are able to survive in virtually any rugged terrain. Because of considerable dietary overlap, Barbary sheep compete with mule deer and bighorn sheep, a species that formerly inhabited the Guadalupe escarpment (the reintroduction of bighorns is a long-term resource management objective for the park). Sightings of Barbary sheep are documented by observation and are recorded. Due to the rugged terrain, monitoring of Barbary sheep is difficult, and solutions for their control are limited. Any success at reducing the park’s population has been negated by the species’ mobility across the park boundary.

Wildlife at Proposed Development Sites

Portions of the proposed development sites were initially surveyed for wildlife in 1993. Common species are listed below.

Mouth of Slaughter Canyon. Mule deer, javelina, and quail are prevalent in this area. There are also past, unconfirmed reports of nesting buntings and vireos.

Base of the Escarpment. The area identified for relocating NPS operations under alternative 3 is used by mule deer, javelina, and quail. Other species include coyote, badger, several small mammals, and birds such as ducks, which use the sewage lagoons. The lagoons are also an important water source for bats.

The area identified for relocating visitor operations under alternative 3 has an abundant deer population, along with javelina, coyote, badger, and numerous rodents. Quail feed on the seeds of the abundant whitethorn plant.

THREATENED OR ENDANGERED SPECIES

Subsurface Species

No threatened or endangered species listed by the federal or state government have yet been identified in the park’s subsurface environment.

The occult little brown bat (*Myotis lucifugus occultus*), a Myotis subspecies, has not been identified within the park but has potential to inhabit natural caves or abandoned mine tunnels in small numbers in the Carlsbad region. This bat is classified by the U.S. Fish and Wildlife Service as a category 2 candidate species. (These are species for which the Fish and Wildlife Service has information indicating that a proposal to list is possibly appropriate, but for which substantial data on biological vulnerability or threats are not currently known to support immediate listing. It is NPS policy to give these species the same protection as listed species.)
AFFECTED ENVIRONMENT

Surface Species

The U.S. Fish and Wildlife Service has identified four species that are protected under provisions of the Endangered Species Act of 1973 (as amended) and that could be affected by proposed actions. The bald eagle (*Haliaeetus leucocephalus*) and Lloyd's hedgehog cactus (*Echinocereus lloydii*) are listed as endangered. The Lee pincushion cactus (*Coryphantha sneedii* var. *leei*) and the Mexican spotted owl (*Strix occidentalis lucida*) are listed as threatened.

- The bald eagle occupies New Mexico primarily as a winter resident, but it is also a migrant, with several nesting in the state. Birds roost in large trees, which may or may not be close to their feeding areas. Bald eagles are found in riparian areas adjacent to rivers, reservoirs, and ponds. Rabbits, fish, and waterfowl are their primary prey. Listed as an accidental visitor on the park's bird checklist, bald eagles are reported infrequently during migration. The park does not contain the proper habitat for the species.

- The endangered Lloyd's hedgehog cactus is associated with dry rocky hills, slopes, and limestone and granite outcrops at approximately 5,000 feet elevation. It occurs in a few places in Eddy County, including Carlsbad Caverns National Park. There is no recovery plan for the species, but the park's *Resources Management Plan* addresses the need for a plan. Lloyd's hedgehog cactus is a candidate for delisting because it has been found to be of hybrid origin.

- The threatened Lee pincushion cactus is associated with the eastern edge of the Guadalupe Mountains, and Carlsbad Caverns National Park is the only known location for this species. The distribution of this plant in the park was documented in a 1984 NPS survey, which mapped the known population of plants and identified the preferred habitat. A new population of this plant was found in the park in 1994. A recovery plan was prepared by the U.S. Fish and Wildlife Service in 1986, and the park currently photo-monitors this species.

- The Mexican spotted owl has been recorded in all New Mexico national forests at elevations from 3,700 to 10,000 feet. Typical habitat consists of caves, cliff ledges, witches'-broom, and stick nests of other species in mature and old-growth forest associated with steep canyons. The preferred vegetation type is mixed conifer; however, spotted owls can be found in piñon/juniper, pine/oak, and ponderosa pine. Listed as an occasional visitor on the park's bird checklist for winter and spring, this species is not often reported in the park due to the scarcity of preferred habitat. Surveys could reveal a more substantial population, especially on the park’s western boundary bordering Lincoln National Forest.

In addition to these species identified by the Fish and Wildlife Service, park staff are aware of two other federally listed endangered species — the peregrine falcon (*Falco peregrinus*) and the southwestern willow flycatcher (*Empidonax trailli extimus*).

- The peregrine falcon, listed as rare on the park's bird checklist for spring and fall, is not reported every year. Nesting peregrines have been observed in the Guadalupe Mountains but not in the park, which contains marginal habitat. Peregrines have been sighted in Slaughter Canyon in recent years.

- The southwestern willow flycatcher is listed as fairly common on the park’s bird checklist for spring and fall; however, it is infrequently reported in the park. Its preferred habitat is riparian areas, such as the stream/wetland complex at Rattlesnake Springs.

Category 2 candidate species with potential for occurring in the park include the following:
In addition to these species, animal and plant species of concern to the state of New Mexico that may occur in the park or its immediate vicinity are listed in appendix G.

The Rattlesnake Springs area was surveyed in the spring of 1995 for breeding southwestern willow flycatchers (federally endangered). No birds of this species were found in the area.

Preliminary surveys for threatened or endangered plants were conducted in 1995 for some proposed development areas. For alternative 2 the Slaughter Canyon ranger residence site and the general vicinity of the possible Ogle Cave trail were surveyed. For alternative 3 the Slaughter Canyon visitor contact station site and general areas near the base of the escarpment proposed for the NPS operations and transit/orientation centers were surveyed. Constructing these facilities would not be likely to adversely affect proposed, threatened, or endangered plants.
CULTURAL AND PALEONTOLOGICAL RESOURCES

AN OVERVIEW OF HUMAN USE AND ASSOCIATED SITES

Cultural resources in and around Carlsbad Caverns National Park include prehistoric and historic archeological resources; historic structures, districts, and landscapes; and ethnographic resources.

Around 125 of the park's archeological sites (including pictographs and petroglyphs), ranging in age from about 12,000 years B.P. to the 20th century, have been recorded. Information on prehistoric sites is very limited, and few if any have been directly attributed to a particular cultural group. However, most appear to have been associated with Apachean and other later groups who used the area from circa A.D. 1100 to the 1800s. The park's pictographs — both dark-zone paintings in Slaughter Canyon Cave and pictographs in other caves and shelters — are thought to have been created by culturally different groups during several different periods.

Archeological sites and certain natural features also have sacred and historic meaning for contemporary Indian peoples. Both the Mescalero Apache and the Ysleta del Sur Pueblo view much of the park landscape as spiritually active, containing certain sites and natural features that are vital to the continuation of their religions. Although the Apache left few traces on the Carlsbad landscape, the remains of their mescal pits and camps show a long-standing association with this area. It has been suggested that some of the pictographs in the park were created by Apache groups. The Ysleta have traditionally visited neighboring mountains and deserts to gather medicinal herbs, and they feel a strong affinity for the pictographs at Carlsbad.

Three properties — the Caverns Historic District, Rattlesnake Springs Historic District, and Painted Grotto — are listed on the National Register of Historic Places. The historic districts reflect Euro-American settlement of the West and the development of national parks in the Southwest, including rustic architecture.

The park's archival resources include all prehistoric and historic artifact collections from the park area, and researchers' manuscripts and notes, maps, and photographs. Paleontological, botanical, zoological and other natural specimens and associated records are also part of this collection.

Prehistoric Use

Prehistoric human use of the Carlsbad area by small mobile bands may date back to at least 8,000 B.C. Of the five significant Paleo-Indian sites in southeastern New Mexico, two are found in the Carlsbad area. Two local caves contain Pleistocene animal remains that appear to have been associated with hearths and early lithic tools. Characteristic Paleo-Indian artifacts have been found by local collectors in sand dune areas along the river courses. Even though there are numerous lithic scatters across the park, very little inventory or research has been done, and diagnostic artifacts are often lacking.

During the Archaic period of human occupation (ca. 5000 B.C. to perhaps A.D. 900) the Carlsbad area was sparsely populated by small groups whose subsistence focused on gathering plants and hunting small game. Occasionally well-preserved remains of their foodstuffs, household items, tools, and weapons have been discovered in the park, and some of the park's pictographs are thought to be associated with Archaic occupations. A number of Guadalupe Mountains Archaic style color pictographs have been found deep within Slaughter Canyon Cave. These dark-
zone pictographs are extremely rare, and this
cave is one of very few in North America where
they have been found.

These significant Paleolithic and Archaic sites
hold great potential for determining faunal and
climatic change in the larger region and for
insights into a poorly known period of early
human history in this region.

Between about A.D. 900 and perhaps 1450,
people occupying this area culturally reflected a
southern phase of the Jomada branch of the
Mogollon people — a classification that suggests
a population whose cultural origins may lie in
Mexico. Based on ceramics, these groups
participated in an extensive trade network and
employed a mixed subsistence strategy of
hunting, gathering, and agriculture. Remains left
by these prehistoric groups include lithic and
ceramic scatters, sites in caves, ring middens, and
open campsites that may represent special
activity areas or seasonal use. Pictographs that
may date to this period appear in a number of
areas, and some are among the most elaborate
and well preserved in the Southwest.

Ring middens make up perhaps two-thirds of the
sites within the park. Ring middens (also known
as midden circles, sotol pits, or mescal pits) are
doughnut-shaped structures of burned rock, ash,
and occupational debris. Some ring middens
have subsurface cooking pits. There is consid­
erable variation in these sites, and they present a
complicated problem concerning their use, age,
and origins (Greer 1965). However, it is gener­
ally assumed that their major use was in roasting
and preparing mescal plants (agave) or sotol
bulbs for food.

Many prehistoric sites have been damaged or
destroyed by cattle, relic hunting, vandalism,
looting, cave exploration, and road building.
Many of the pictograph sites are fading and
spalling.

**Historic Use**

Spanish conquistadors reported numerous
pueblo-dwelling groups along the middle Rio
Grande in the mid 1500s, including the Isleta
Pueblo. Following the Pueblo Revolt of 1680,
residents of this pueblo either fled to or were
forcibly removed to the El Paso area, where the
community now known as Ysleta del Sur was
formed. Also, historic records document that the
Siete Rios Apaches were occupying areas
between the Pecos River and the Guadalupe
Mountains during the mid-1600s. Zia Pueblo oral
tradition includes migration stories that tell of
specific places the Zia have lived in the past.
These stories specifically name areas within the
park.

European settlement of southeastern New
Mexico followed the opening of a wagon road
along the Black River by Spanish and Mexican
traders and travelers. By the mid-1700s the
Apache were raiding Mexican settlements while
fighting the Spanish on the west and the
Comanches on the east. In the warmer months
the Mescalero hunted game and raised corn in the
flatlands, retiring to stream drainages in the
mountains (including the Guadalupe) in the
winter. Here they built semipermanent rancherias
villages with corrals for their horses.

A short-lived peace during the latter part of the
1700s was broken by Spanish campaigns against
the Apache early in the 1800s. During the mid to
late 1800s, numerous American military
expeditions mounted an all-out campaign against
the Mescalero, pursuing them and destroying
their food supplies, weapons, and rancherias. In
turn the Apaches continued to raid ranches for
livestock and provisions, hiding in the Guadalupe
Mountains when pursued. During the Civil War,
a policy of total extermination of the Indians was
promulgated by General Carelton. Eventually the
Mescalero were forced onto reservations. There
are some indications that skirmishes between the
U.S. military and the Mescalero Apache during
the 1860s might have occurred in either
Rattlesnake or Slaughter Canyon.
Texas cattle drovers established trails, including the Slaughter cattle trail used during the 1860s, and open-range ranching camps were built across the area. Drought and overgrazing, fencing, and the railroad marked the transition from open range to homesteads by the 1880s, including Rattlesnake Springs and Washington Ranch. These ranches used ditch irrigation systems and earthen water tanks for cattle and goat herding. Numerous remains of these homesteads and water control systems are found throughout the park, generally near water sources. Henry Harrison, who homesteaded Rattlesnake Springs, developed the spring, built an irrigation system for his fields, constructed an adobe home, and planted trees and orchards.

During the early part of the 20th century the park area was the focus of extensive guano mining; thousands of tons of fertilizer were removed from several of the park’s caves. The history of guano mining in this region is superbly illustrated by well-preserved historic artifacts and features such as a partially completed mine tunnel and well-preserved remains found in the Ogle/Rainbow Cave complex.

A cavern referred to as Bat Cave (later called Carlsbad Cavern) was known to area homesteaders by the 1870s. By the turn of the century, explorer James White had begun to build trails, ladders, and other facilities to help visitors see Bat Cave as he guided them through its dark passages. By the 1920s lighting and access into the cave were improved, resulting in a proliferation of schemes to encourage tourists to come to the area. Since about 1926 most development at the caverns was focused on tourism. Guides stayed in an assortment of tents and shacks adjacent to the cavern entrance. In the 1920s and 1930s stone structures were built on the north slope of Bat Cave Draw and at the bottom of the draw where the terrain was leveled and terraced for visitor access to the cave.

After Rattlesnake Springs was acquired by the National Park Service in 1934, it was subsequently developed by the Civilian Conservation Corps and used by the military during World War II as a rest camp for recreational use. During more recent times, the Park Service has further developed the springs area, concreting the pond and ditches, building a pump house, an adobe residence, and managing the vegetation. Irrigation water is used to maintain the landscape surrounding the spring.

SUMMARY OF CULTURAL RESOURCES

Previous Archeological Investigations

Investigations of regional archeological resources were begun in the late 1920s and early 1930s (Howard 1930 and 1932, Mera 1938, and Roberts 1929). These early surveys were general in nature and covered only the southern Guadalupe Mountains. Both Howard and Roberts removed numerous well-preserved perishable articles from caves along the escarpment. Howard reportedly found Pleistocene mammal bone in association with a possible Folsom spearpoint; Ferdon (1946) encountered a hearth associated with extinct mammal remains. Mera reported both on caves and open sites such as the ubiquitous mescal roasting pits and assumed that cave deposits and mescal pits reflected seasonal occupations.

Other investigations done between 1920 and 1960 generally focused on individual sites (Bradley 1959). Spangle et al. (1959) conducted a preliminary survey of the park, identifying several basic site types—cooking pits, rock shelters, caves, and pictographs. It is expected that future systematic surveys will locate many more sites, increasing scientific data available to the park for resource management, research, interpretive programs, and ethnographic ties.

Historic Districts and Cultural Landscapes

The Caverns Historic District and the Rattlesnake Springs Historic District are both listed on the National Register of Historic Places. Elements of
the historic districts also make them eligible for
designation as cultural landscapes. Cultural
landscape features associated with these districts
were inventoried in 1993 (NPS, Colby 1993a).

A cultural landscape may be described as an
expression of human adaptation to and use of the
natural resources of an area. All cultural
landscapes evolved from and depend on natural
resources — interconnected systems of land,
water, native vegetation, and wildlife. Human use
alters many of these systems, either deliberately
or accidentally.

Caverns Historic District. The Caverns Historic
District encompasses 13 rustic stone and adobe
structures that are used as maintenance, resi­
dential, utility, cave research, and administrative
facilities. It also includes landscape features and
plantings surrounding the natural entrance to
Carlsbad Cavern. The historic parking area
served the entrance and ticket office. The earliest
buildings (done in Pueblo Revival style) and the
terracing are built of local bedrock limestone;
later construction was of adobe, in the New
Mexico Territorial Revival style.

Eight of the original 16 stone buildings remain
unaltered; one was stuccoed during the 1960s.
The original elevator building and visitor center
(circa 1940) in its existing location was faced
with rubble stone and strongly resembled the
earliest structures in the district. However, the
visitor center has been remodeled several times,
and today has a poured concrete facade that has
compromised the architectural integrity of the
original building. Landscaping includes terracing
and parapets in the parking lot and along roads
and trails. The 1960s limestone amphitheater and
stone comfort station (1984–5) are consistent in
design and material with the rest of the district.

A 1993 historical background study reexamined
the historic district and concluded that it is part of
a larger potential cultural landscape that also
includes three peripheral areas: the nonhistoric
Mission ‘66 residences north of the district, the
visitor center area to the south, and the water
tanks and pipelines to the northwest. Together
these structures and landscape features represent
the rustic theme for facility development used
during the formative years of the national park
system. They also illustrate NPS stylistic archi­
tectural development before World War II and
are examples of CCC work of the Depression
era. Their rustic design exemplifies harmony with
the natural setting.

The landscape components have a strong visual
cohesiveness throughout their evolution from
rubble stone masonry to stuccoed structures,
because of the consistency of colors, massing,
and limestone curbing. The use of natural
Chihuahuan Desert vegetation also strengthens
the tie to the setting (NPS, Colby 1993a). The
cultural landscape has been inventoried and
identified as a potential national register property,
but it is still undergoing evaluation. For the
purposes of this plan, the landscape has been treated
as eligible for the national register.

Rattlesnake Springs Historic District. Because
of the combination of significant natural and
cultural features at Rattlesnake Springs, this area
has recently been reexamined and inventoried as
a potential cultural landscape (NPS, Colby
1993a). Some of the significant characteristics
include irrigated fields, fruit and ornamental
trees, and two CCC-era structures. The adobe
ranch house and pumphouse are representative of
Territorial Revival and Pueblo Revival archi­
tecture, respectively. The irrigation system —
with its gravity flow, concrete-lined ditches and
pond, and sluice gates — is the most significant
feature of the cultural landscape.

PALEONTOLOGICAL RESOURCES

The park has significant paleontological re­
sources, including Permian-age limestone reef
fossils and extinct Pleistocene-era animal re­
mains. Permian-age fossils (200–225 million
years old) are found in limestone exposures in
the caves and canyons. The slightly corrosive nature
of the cave air dissolves the softer limestone,
leaving highly etched bas-reliefs of gastropods, sponges, calcareous algae, and other Permian fossils in some of the most beautiful exposures in the world. The Permian marine deposits are important to the park’s interpretive story and provide information for scientific interpretation of biogeographic conditions on the North American continent.

Pleistocene animal remains, including the large free-tailed bat, horse, camel, giant ground sloth, red wolf, dire wolf, musk ox, bison, cervids, and undetermined antilocaprids, have been found in several of the park caves. It is likely that most of the park’s caves were open during the Pleistocene, creating excellent places for animal shelter and conditions for the preservation of now-extinct species.

Significant paleontological deposits, which may date from 20,000 to 30,000 years B.P., have been found on adjacent USFS and BLM lands. This suggests that some paleontological deposits in caves and shelters within the park could have significant fossil depth, conceivably containing species predating the Pleistocene. The park’s paleontological remains are exceptional resources and provide unexcelled research opportunities.
THE VISITOR EXPERIENCE

Scenery

As visitors travel south from the town of Carlsbad toward the park, the relatively flat Chihuahuan Desert gives way to the Guadalupe escarpment, rising up and extending to the southwest. Travelers heading east from El Paso see the steeper, more dramatic south slope of the escarpment as they approach the park. The cavern entrance area development is fairly noticeable on the escarpment rim, visible primarily because of shade trees.

Whites City, just outside the park entrance, is a cluster of motels, restaurants, shops, a gas station, a grocery store, and a campground.

The park entrance road winds its way through a prominent gap in the escarpment (Walnut Canyon), giving visitors views of the Chihuahuan Desert landscape, the dry Walnut Canyon drainage, and the pockmarked cliffs of the limestone reef. The road hugs the contours of the reef and the canyon, minimizing its visual intrusion on the natural scene.

After several miles the road leaves the canyon at a sharp curve and climbs a steep hill to the top of the escarpment and crosses to the south rim. From here and from the outer edges of the visitor center parking lots are dramatic panoramas of the desert, with views of an occasional ranch, irrigated fields, and Rattlesnake Springs. The base of the escarpment below is not visible. The view to the west on clear days is of the Guadalupe Mountains, some 30 miles away.

From the visitor center and along the trail to the cavern’s natural entrance, the picturesque stone structures of the Caverns Historic District can be seen across Bat Cave Draw. This area looks much as it did 60 years ago. A few structures have been removed in recent decades, and the overall scale of development has grown due to the addition of residences, maintenance buildings, trailers, and shade trees. The original parking area dominates the relatively flat area near the draw, and the outdoor amphitheater faces the cavern entrance.

The road following the base of the escarpment (often referred to as the sewage lagoon road by park staff) offers views of the Chihuahuan Desert in the foreground. The steep slope of the escarpment dominates the view to the north, and the Guadalupe Mountains are visible to the west. From higher points along the sewage lagoon road, U.S. 62/180 is also visible.

Regional Information

Visitors to Carlsbad, New Mexico, can get information about the park at a small NPS contact center in town, which also houses the park’s administrative offices. This facility contains an information desk, a small cooperating association sales outlet, and an audiovisual program designed to orient visitors to the park and other attractions in the region. The center also dispenses information and sales items for Guadalupe Mountains National Park.

Park staff work closely with the Carlsbad Chamber of Commerce and area motel operators, offering training programs for employees so that accurate information is given to visitors. Employees who complete the training are given an annual park pass so they can remain current on park facilities and programs. In addition, during the peak visitor season the chamber of commerce operates a regional information desk at the main park visitor center.

As visitors approach Whites City, a highway sign tells motorists to tune their radios to the park’s traveler’s information station (TIS), with broadcasts in English and Spanish. Interpretive exhibits
AFFECTED ENVIRONMENT

at the first pullout inside the park entrance also present a general orientation to the park, as well as information about cave tour options.

Park Access

A number of pullouts along the entrance road, which leads to the visitor center, provide opportunities for visitors to see and learn about aspects of the Chihuahuan Desert and associated elements of human history. Most of these pullouts are marked with "Exhibit Ahead" signs. Wayside exhibits interpret the resources, and in some cases visitors must take a short trail to see key features.

Few visitors entering the park take advantage of these stops. Park staff feel that most people are intent on reaching the visitor center and getting into the cave. More visitors stop on their way out of the park; however, there are rarely more than two to four vehicles at any pullout.

Visitor Center

Exhibit kiosks outside the entrance to the visitor center provide information about cavern tour options.

Inside the building visitors cross the lobby to the information/ticket sales desk. Here, information on tour options is repeated. On peak days visitors stand in long ticket lines, which often extend well into the exhibit areas of the lobby. Visitors can leave their pets at the concession-operated kennel and rent a locker to store items while touring the cave. Restrooms are behind the information/ticket sales desk. Visitors can rent a portable audio device they can carry with them on the tour and that broadcasts interpretive messages in English or Spanish at stops along the tour route.

In the visitor center visitors can look at a variety of interpretive exhibits, attend a short audiovisual program on the bats in the park, shop in the cooperating association bookstore or conces-

sioner gift shop, get something to eat in the restaurant, or climb the stairs to the observation platform on top of the building. Most people, however, choose to visit these areas after they have toured the cave.

After purchasing tickets, visitors either line up at the elevators or walk the 0.25-mile path to the natural entrance. Before visitors get on the elevators, a ranger gives a short orientation talk about safe and proper conduct in the cave. Visitors walking down into the cavern are given a similar orientation talk near the cavern entrance. Restrooms near the natural entrance offer a last opportunity before visitors begin their descent.

Cavern Tours

Visitors to the main cavern may choose from three main tour options, each about 1 mile in length.

- The self-guided natural entrance route starts at the cave’s natural entrance and descends along the Main Corridor to the underground elevator lobby area (about 750 feet underground).

- The self-guided Big Room tour, which is mostly level and accessible to mobility-impaired visitors, starts near the visitor center elevators, and visitors may take the elevators down into the cavern for this tour. Visitors who take the natural entrance route can connect to the Big Room route near the elevators if they wish.

- The King’s Palace tour is led by rangers and visits four highly decorated chambers (the Green Lake Room, King’s Palace, Queen’s Chamber, and Papoose Room), which are some 830 feet beneath the surface. Formerly these rooms were part of the self-guided natural entrance tour, but in an effort to curtail resource damage, they are now accessible only by guided tours (limited to 75 people per tour).
Cavern Tour Route
Carlsbad Caverns National Park
United States Department of the Interior
National Park Service
DSC 7-4996 • 130 • 20,031 A

Map information courtesy of the Cave Research Foundation.
A combination of wayside exhibits and audio devices provide interpretive messages along the tours. Roving rangers and volunteers are available to talk with visitors, answer questions, and give impromptu talks. All visitors leave the cave on the elevators.

Employees provide protection for cave resources and respond to visitor emergencies. However, even with a ranger presence and the use of electronic security systems, the park estimates the loss of or damage to over 2,000 cave features each year.

Other guided tours lead visitors to Lower Cave, Hall of the White Giant, and Left-hand Tunnel in Carlsbad Cavern, and also to Slaughter Canyon Cave and Spider Cave. Reservations are required, and for some tours visitors must meet age requirements and be physically able to meet the challenges of the tour.

**Surface Activities**

Besides the cavern tours, one of the most popular attractions in the park is the evening bat flight. Each evening from spring through fall, when the bats are residing in the cave, rangers present interpretive talks while visitors await the nightly flight. These programs are conducted in an amphitheater within view of the cave’s natural entrance, and during the peak summer season attendance often exceeds 1,000 people.

To better experience and learn about the Chihuahuan Desert, visitors can walk a 0.5-mile nature trail near the visitor center. Small wayside exhibits identify many of the desert plants and also point out an area once used for mining bat guano at Carlsbad Cavern.

In addition to the pullouts along the park entrance road, another way to experience the desert is to drive the 9-mile Walnut Canyon desert drive. At the start of the loop, visitors can purchase a self-guiding brochure and stop at the numbered stations along the route.

Although Rattlesnake Springs is historically significant, it is not currently interpreted. The area is well-known as a bird-watching area and attracts many birders. The park has developed a picnic area near the site of a former CCC camp.

**VISITOR USE DATA**

**Present Visitation**

*Ten-Year Annual Data and Analysis.* Five categories of data present an accurate picture of visitor use at Carlsbad Caverns National Park: (1) entry into the main cavern (requires ticket purchase), (2) entry into Slaughter Canyon Cave (by reservation only), (3) entry into any of the wild caves (by permit only), (4) overnight backcountry use (by permit only), and (5) Rattlesnake Springs (counts based on a traffic counter). The final estimate of park use was determined by adding 10% to the main cavern numbers to account for visitors who visited the park but were not counted because they did not enter a cave or participate in an activity that was accurately counted. For example, people could attend the bat flight program or use the Walnut Canyon desert drive without having been included in one of the other use categories. Visitation declined in the mid 1980s, but in the period 1987 to 1994 visitation seems to have reached a plateau (see table 3).

**Elevator Capacity.** Currently the capacity of the elevators to carry people into and out of the main cavern limits the number of visitors who can be accommodated on peak days. On the busiest days of the year visitors may have to wait 10 or more minutes for a ride. However, a more continuous, even flow of visitors into and out of the cavern on the elevators would allow more people to be accommodated on a daily basis (see appendix H); annually, upwards of 2 million visitors could be served by the elevators. This exceeds current and expected annual visitation by a factor of three.
TABLE 3: CARLSBAD CAVERNS NATIONAL PARK VISITATION, 1984-94

<table>
<thead>
<tr>
<th>YEAR</th>
<th>MAIN CAVERN</th>
<th>RATTLESNAKE SPRINGS</th>
<th>BACK-COUNTRY</th>
<th>SLAUGHTER CANYON CAVE</th>
<th>WILD CAVES</th>
<th>TOTAL USE* (+10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>563,501</td>
<td>7,240</td>
<td>618</td>
<td>6,643</td>
<td>0</td>
<td>634,352</td>
</tr>
<tr>
<td>1985</td>
<td>570,804</td>
<td>10,954</td>
<td>705</td>
<td>5,983</td>
<td>0</td>
<td>645,526</td>
</tr>
<tr>
<td>1986</td>
<td>546,462</td>
<td>8,658</td>
<td>1,067</td>
<td>5,529</td>
<td>0</td>
<td>616,362</td>
</tr>
<tr>
<td>1987</td>
<td>519,289</td>
<td>9,973</td>
<td>1,025</td>
<td>5,767</td>
<td>0</td>
<td>587,983</td>
</tr>
<tr>
<td>1988</td>
<td>523,682</td>
<td>8,153</td>
<td>1,263</td>
<td>5,861</td>
<td>47</td>
<td>591,374</td>
</tr>
<tr>
<td>1989</td>
<td>537,870</td>
<td>6,498</td>
<td>318</td>
<td>6,034</td>
<td>649</td>
<td>605,156</td>
</tr>
<tr>
<td>1990</td>
<td>517,507</td>
<td>9,715</td>
<td>395</td>
<td>6,541</td>
<td>1,045</td>
<td>586,954</td>
</tr>
<tr>
<td>1991</td>
<td>536,787</td>
<td>7,371</td>
<td>443</td>
<td>7,098</td>
<td>1,170</td>
<td>606,548</td>
</tr>
<tr>
<td>1992</td>
<td>549,073</td>
<td>1,788</td>
<td>436</td>
<td>6,912</td>
<td>2,034</td>
<td>615,150</td>
</tr>
<tr>
<td>1993</td>
<td>550,421</td>
<td>9,421</td>
<td>446</td>
<td>6,031</td>
<td>2,166</td>
<td>623,527</td>
</tr>
<tr>
<td>1994</td>
<td>528,355</td>
<td>28,799</td>
<td>733</td>
<td>5,398</td>
<td>964</td>
<td>617,087</td>
</tr>
</tbody>
</table>

* Total use was calculated by adding 10% to the main cavern visitation to estimate the number of people not entering the cave and adding this amount to the figures in the other four columns.

Present elevator capacities are being exceeded because visitor use is concentrated in June, July, and August. Spreading visitor use throughout the year by encouraging visitors to come during the shoulder seasons and off-season would be a viable method to alleviate any overcrowding experienced during the summer. A longer operating day could also be instituted if deemed reasonable and feasible.

Limiting the numbers of people that may use the elevators on any particular day may be necessary for a few days per year when the daily elevator capacity is reached. This could prevent some visitors from easily accessing the cave.

Funding, staffing, resource protection, and the quality of the visitor experience are more important factors to consider in setting the volume of visitor use. These other factors may also prove to be more limiting than the physical capacity of the elevators on a daily basis.

Parking Capacity. Approximately 900 public parking spaces are available in the three parking areas near the visitor center. According to a 1988 survey, the average length-of-stay for visitors entering the cave is four hours, resulting in a daily parking turnover rate of two. (Now that the park is offering more tour options, the average length of stay may have increased; a survey would be needed to determine this.) During June, July, and August the average number of persons per vehicle is 3.34.

The daily capacity of parking facilities is approximately 6,010 persons: (900 spaces × 2 vehicles per day per space × 3.34 persons-per-vehicle = 6,012 persons per day). The estimated capacity can be exceeded on some peak days, in which case the entrance road is closed and one vehicle allowed in as one leaves.

Sixteen parking spaces are designated for buses. Figuring an average of 40 persons per bus and a turnover rate of two per day, an additional 1,280 people can be accommodated (16 buses × 40 persons per bus × 2 buses per parking space per day = 1,280 persons per day).

The total number of persons that could be served by parking facilities is estimated at approximately 7,300 per day during summer. This capacity matches the daily capacity of the four elevators if operated for a 10-hour day.

Month-by-Month Data and Analysis. The peak use season for Carlsbad Caverns is June, July, and August (see table 4 and figure 1). In July 1994 an average of more than 3,200 persons per
Characteristics of Visitor Use. Carlsbad Caverns National Park is open every day of the year except Christmas. During the off-season, hours of operation are reduced, and some guided tours are offered less frequently.

Peak use occurs during the Easter, Memorial Day, July 4th, and Labor Day holidays. The peak month for 1993 was July, when an average of 112,499 visitors day toured the main cavern, with 5,000 to 6,000 visitors on the busiest days. The annual pattern also clearly shows that visitation gradually increases during March, April, and May and decreases during September and October. For January, the least busy month, an average of only 593 persons per day toured the main cavern.

### Table 4: Carlsbad Caverns National Park Visitation by Month, 1994

<table>
<thead>
<tr>
<th>MONTH</th>
<th>MAIN CAVERN</th>
<th>RATTLE-SNAKE SPRINGS</th>
<th>BACK-COUNTRY</th>
<th>SLAUGHTER CANYON CAVE</th>
<th>WILD CAVES</th>
<th>TOTAL USE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>18,386</td>
<td>1,163</td>
<td>9</td>
<td>286</td>
<td>133</td>
<td>21,816</td>
</tr>
<tr>
<td>February</td>
<td>19,437</td>
<td>818</td>
<td>18</td>
<td>292</td>
<td>65</td>
<td>22,574</td>
</tr>
<tr>
<td>March</td>
<td>53,011</td>
<td>326</td>
<td>235</td>
<td>345</td>
<td>172</td>
<td>59,390</td>
</tr>
<tr>
<td>April</td>
<td>39,755</td>
<td>0</td>
<td>24</td>
<td>385</td>
<td>137</td>
<td>44,277</td>
</tr>
<tr>
<td>May</td>
<td>53,528</td>
<td>0</td>
<td>87</td>
<td>306</td>
<td>67</td>
<td>59,022</td>
</tr>
<tr>
<td>June</td>
<td>69,175</td>
<td>0</td>
<td>45</td>
<td>7,788</td>
<td>103</td>
<td>77,019</td>
</tr>
<tr>
<td>July</td>
<td>99,305</td>
<td>0</td>
<td>85</td>
<td>1,127</td>
<td>51</td>
<td>110,499</td>
</tr>
<tr>
<td>August</td>
<td>63,746</td>
<td>0</td>
<td>35</td>
<td>722</td>
<td>72</td>
<td>70,950</td>
</tr>
<tr>
<td>September</td>
<td>35,583</td>
<td>0</td>
<td>27</td>
<td>282</td>
<td>62</td>
<td>39,512</td>
</tr>
<tr>
<td>October</td>
<td>31,277</td>
<td>13,004</td>
<td>36</td>
<td>320</td>
<td>20</td>
<td>47,785</td>
</tr>
<tr>
<td>November</td>
<td>22,271</td>
<td>13,488</td>
<td>123</td>
<td>350</td>
<td>44</td>
<td>38,503</td>
</tr>
<tr>
<td>December</td>
<td>23,171</td>
<td>0</td>
<td>9</td>
<td>205</td>
<td>38</td>
<td>25,740</td>
</tr>
<tr>
<td>Total</td>
<td>528,355</td>
<td>28,799</td>
<td>733</td>
<td>5,398</td>
<td>964</td>
<td>617,087</td>
</tr>
</tbody>
</table>

* Total use was calculated by adding 10% to the main cavern visitation to estimate the number of persons not entering the cavern and adding this amount to the figures in the other four columns.
3,252 visitors per day entered the main cave. As with most parks, weekend use is greater than during the rest of the week. Typically on weekdays during the summer 2,000 to 3,000 visitors tour the main cavern, increasing to 4,000 to 6,000 on weekends.

**Origin of Visitors.** A 1988 survey of park visitors showed they came from 44 states and 12 foreign countries. Most visitors were from Texas (37.5% of respondents), New Mexico (12.9%), and California (12.5%). Nearly 2% were from foreign countries. Almost 17% of the sample lived within a one day’s drive of the park (considered to be the local area), including the cities (and surrounding regions) of Las Cruces, Carizozo, Roswell, and Clovis, New Mexico, plus Lubbock, Midland, and El Paso, Texas.

**Length of Stay.** The 1988 survey indicated 49% of visitors stayed in the park for three or more hours, and 34% stayed two to three hours. The average stay varied by activity. Main cavern visitors typically spend about four hours in the park, while visitors coming to watch the evening bat flight spend about 1-1/2 hours. Backcountry day hikers (a relatively small number) stay an estimated eight hours. Visitors to Rattlesnake Springs (a popular destination for birders) stay about four hours.

**Visitor Use Trends: Projections of Potential Demand**

Table 5 and figure 2 show projections of future visitor use for the park. These projections are an estimate of visitation based on a simple time series regression model and data from the past 10 years.

From 1984 through 1994 visitors to the main cavern accounted for an average of 88% of the total use of the park. Thus, future main cavern entries may be estimated by multiplying each of the values in table 5 by 0.88.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>LOW PROJECTION</th>
<th>MEDIUM PROJECTION</th>
<th>HIGH PROJECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>607,100</td>
<td>626,400</td>
<td>645,800</td>
</tr>
<tr>
<td>1996</td>
<td>610,600</td>
<td>631,300</td>
<td>652,100</td>
</tr>
<tr>
<td>1997</td>
<td>614,000</td>
<td>636,300</td>
<td>658,300</td>
</tr>
<tr>
<td>1998</td>
<td>617,200</td>
<td>641,200</td>
<td>665,200</td>
</tr>
<tr>
<td>1999</td>
<td>620,400</td>
<td>646,100</td>
<td>671,900</td>
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<tr>
<td>2000</td>
<td>623,400</td>
<td>651,100</td>
<td>678,700</td>
</tr>
<tr>
<td>2001</td>
<td>626,400</td>
<td>656,000</td>
<td>685,500</td>
</tr>
<tr>
<td>2002</td>
<td>629,400</td>
<td>660,900</td>
<td>692,500</td>
</tr>
<tr>
<td>2003</td>
<td>632,200</td>
<td>665,800</td>
<td>699,400</td>
</tr>
<tr>
<td>2004</td>
<td>635,100</td>
<td>670,800</td>
<td>706,500</td>
</tr>
<tr>
<td>2005</td>
<td>637,900</td>
<td>675,700</td>
<td>713,500</td>
</tr>
</tbody>
</table>
Figure 2: Actual and Projected Total Park Visitation, 1984-2005
The headquarters office for the superintendent and management support staff is in a stone structure in the Caverns Historic District on the escarpment. This structure also houses resource management and visitor protection staff and the park's library. The administrative division, which also serves Guadalupe Mountains National Park, has offices in the city of Carlsbad. Cave resource management staff and cave researchers are housed in three small stone structures in the Caverns Historic District.

The park's maintenance function is in five buildings within the Caverns Historic District.

Two Caverns Historic District buildings dating from the 1930s contain a total of seven 1- and 2-bedroom apartments that are used for permanent and long-term employees. Other employees are housed in two 1960s buildings north of the historic district, each of which contains six 3-bedroom apartments. Three other historic stone structures house seasonal employees in dormitory arrangements.

A historic ranger residence and pumphouse and a stable are in the Rattlesnake Springs unit. The park also has a small patrol cabin in the backcountry near the west boundary, known as Putman cabin.
SOCIOECONOMIC ENVIRONMENT

REGIONAL LAND USE

Carlsbad Caverns National Park lies wholly within Eddy County, New Mexico, and is bounded by federal, state, and private lands. The park's principal neighbors are the U.S. Forest Service (Lincoln National Forest borders the far western edge of the park) and the Bureau of Land Management (to the north, east, and south). Scattered parcels of state and private land also border the northern and southern park boundaries. The Rattlesnake Springs detached area is surrounded by privately owned land.

Lincoln National Forest is managed under multiple use/sustained yield principles in a way that maximizes long-term net public benefits consistent with resource integration, environmental quality, and management considerations (FS 1986). Recreational use is also allowed.

BLM lands are managed according to the principles of multiple use and sustained yield (recreation, range, timber, minerals, watershed, fish and wildlife, wilderness).

New Mexico state lands are managed for the benefit of the state's citizens and to maximize income to state agencies. State lands are generally scattered in a checkerboard pattern among BLM and private lands. Leasing for oil and gas production and grazing provide important revenue in the region around the park, and maximizing revenues is a major goal. This goal can conflict with the goals of other agencies, and resource conservation may not be achieved.

There is no countywide zoning in Eddy County. As a result, the use and development of private lands around the park are largely unregulated; however, Eddy County did adopt an Interim Land Use Policy Plan (ordinance) in 1992. Private lands surrounding the park are generally used for ranching, mining (including oil and gas extraction), or other commercial purposes (e.g., Whites City).

Rattlesnake Springs is bordered by the privately owned Washington Ranch and land owned by the Nature Conservancy. The ranch is used for live-in services for special populations (developmentally handicapped). The Nature Conservancy lands are used to protect natural habitat. In 1984 the Park Service and the Nature Conservancy entered into a memorandum of understanding whereby the Park Service agreed to protect stream and wetland habitat and to preclude uses or activities that would threaten the native flora and fauna.

LOCAL ECONOMY

Present Economic Conditions

Population. Approximately one-half of Eddy County's population lives in the city of Carlsbad (table 6). In 1992 Eddy County had a workforce of approximately 21,552 persons and an unemployment rate of 6.4% (table 7).

<table>
<thead>
<tr>
<th>YEAR</th>
<th>1990</th>
<th>1980</th>
<th>1970</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carlsbad</td>
<td>24,952</td>
<td>25,496</td>
<td>21,297</td>
</tr>
<tr>
<td>Eddy County</td>
<td>48,605</td>
<td>47,855</td>
<td>41,119</td>
</tr>
</tbody>
</table>


Economy. Tourism has long been important to the local economy. The city of Carlsbad offers a substantial base of tourist accommodations for the thousands of park visitors who come each year. Whites City is also an important provider of lodging, food, and souvenirs for park visitors.
Table 7: Civilian Labor Force Estimates, Eddy County

<table>
<thead>
<tr>
<th>YEAR</th>
<th>CIVILIAN LABOR FORCE</th>
<th>EMPLOYED</th>
<th>UNEMPLOYED</th>
<th>UNEMPLOYMENT RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>21,552</td>
<td>20,173</td>
<td>1,379</td>
<td>6.4%</td>
</tr>
<tr>
<td>1991</td>
<td>21,333</td>
<td>19,882</td>
<td>1,451</td>
<td>6.8%</td>
</tr>
<tr>
<td>1990</td>
<td>20,464</td>
<td>19,088</td>
<td>1,376</td>
<td>6.7%</td>
</tr>
<tr>
<td>1989</td>
<td>20,330</td>
<td>18,765</td>
<td>1,565</td>
<td>7.7%</td>
</tr>
<tr>
<td>1988</td>
<td>20,370</td>
<td>18,459</td>
<td>1,911</td>
<td>9.4%</td>
</tr>
</tbody>
</table>

Source: Community Survey, Carlsbad Chamber of Commerce; U.S. Bureau of the Census; and New Mexico Department of Labor.

Note: Estimates are given as annual averages.

Carlsbad is the center for the largest potash mining operations in the United States. Employment in this industry has declined in the last 10 years, but due to market conditions, now has begun increasing slightly.

Oil and gas production is another segment of the resource industry that is vital to the economy of Eddy County. In 1990 Eddy County ranked second in oil production and fourth in natural gas production among New Mexico counties. A total of 14,456,000 barrels was marketed, valued at $320,205,000. The sale of natural gas amounted to 165,502,000 million cubic feet, valued at $287,959,000. Approximately 62% of oil production and 65% of gas production was from federal lands. The oil and gas industry has been experiencing a downward trend in New Mexico in general; however, a mini-boom has occurred within the Carlsbad area due to the location of some new oil and gas fields (New Mexico Energy, Minerals, and Natural Resources Department, Oil Conservation Department, Prentiss Childs, pers. comm. 11/18/93).

According to the BLM's Dark Canyon Final Environmental Impact Statement, total natural gas reserves in the Dark Canyon study area are estimated at between 22 and 69 billion cubic feet, with the most likely value being 36 billion cubic feet. This equates to a net present value of between $34 million and $110 million, with a most likely value of $57 million. (Natural gas reserves in Eddy County are estimated at approximately 1,375 billion cubic feet; the most likely estimate of gas reserves in the Dark Canyon area — 36 billion cubic feet — represents 2.6% of this amount.) If developed, production of this gas would occur over a 20-year period. Gas production in Eddy County averaged 148 billion cubic feet per year between 1983 and 1990, and it increased to 184 billion cubic feet in 1991 and 201 billion cubic feet in 1992.

Originally the Carlsbad area was attractive to settlers because of the plentiful grasslands. During the last half of the 18th century cattle grazing was the predominant economic use of the land. Intensive grazing has dramatically changed the vegetative composition of rangeland in many places, but cattle and sheep are still raised in the county and continue to be an important part of the county economy. An early water development project (1906) by the Bureau of Reclamation in the vicinity of Carlsbad allowed for crop diversification. Crops now grown include cotton, alfalfa, hay, sorghum, pecans, and wheat.

In addition to tourism, potash mining, oil and gas, and agriculture, Carlsbad is expanding its economic base into electronics and other high technology industries. About 26 miles east of Carlsbad is the Waste Isolation Pilot Project (WIPP), a U.S. Department of Energy project for...
safe, long-term storage of defense-related, plutonium-contaminated waste. This radioactive waste is to be stored in rooms excavated in ancient salt deposits 2,150 feet below the surface. This project has led to spinoff development in the specialized container production and analytical testing industries. Also, the U.S. Department of Energy is ready to locate additional personnel and functions to the Carlsbad area.

Carlsbad is home to a branch of New Mexico State University, the state's land grant institution. This post-secondary school offers several two-year associate degrees and many types of vocational education.

Carlsbad has a diversified economic base that is relatively healthy. Eddy County employment and earnings for 1992 are displayed in table 8, which shows the relative magnitude of the various sectors of the county's economy.

Growth in the Carlsbad area caused by the development of WIPP has put pressure on the housing market. Rental units are difficult to find; they are rented almost as soon as they come onto the market. New home construction has escalated since 1993. The average price of new homes in 1995 was about $132,000; the average price of home sales in Carlsbad is $64,000 to $65,000. Real estate agencies report that the demand for housing, especially in the rental market, exceeds the available supply. Thus prices are driven higher, and affordable housing is hard to find.

**Transportation/Access.** Carlsbad is served by U.S. Highways 285 and 62/180. Several motor freight carriers and bus lines provide trucking and passenger service connecting the city to other points in the country. Mesa Airlines offers passenger service between Carlsbad and Albuquerque, and rental cars are available at the airport.

**Regional Visitor Facilities and Services.** Facilities in Whites City include two motels, a recreation vehicle campground, a restaurant, several gift shops, a small grocery store, a service station, meeting space for conventions, a museum, and an opera house where theater productions are presented in summer. The motels contain approximately 130 rooms.

Carlsbad is 27 miles northeast of the park's visitor center. Seventeen motels provide more than 1,000 rooms. There are three commercial campgrounds near Carlsbad. Carlsbad Riverfront Park offers picnicking, walking, fishing, and sailing opportunities in the heart of the city. Carlsbad also offers a number of local recreational attractions and facilities, including public parks. All goods and/or services required by the visiting public are available in the city of Carlsbad.

Guadalupe Mountains National Park is 55 miles southwest of Carlsbad, New Mexico, just across the border in Texas. Camping, backpacking, day hiking, picnicking, and ranger-guided walks and talks are the primary visitor activities. Eighty miles of trails access the desert, canyons, and highlands of the park.

Lincoln National Forest west of Carlsbad Caverns National Park offers hiking, caving, camping, picnicking, horseback riding, hunting, and sightseeing. A system of all-weather forest roads and primitive roads provides access to the 285,000 acres within the Guadalupe ranger district. Two major attractions readily accessible by improved road include the Sitting Bull Falls picnic area and Five Points Vista.

The Living Desert Zoo and Garden State Park, on a hillside at the northwest edge of Carlsbad, interprets the flora and fauna of the Chihuahuan Desert. Over 100 species of plants and animals, many of which are native to the state of New Mexico, are on exhibit. It is the only state park in New Mexico offering this type of attraction.

Brantly Lake State Park, 12 miles north of the city of Carlsbad, has two boat ramps, paved parking, and courtesy docks to support public boating activities. A campground, day use picnic area, and beach area are also maintained for public use. Sportfishing is a popular activity.
TABLE 8: EDDY COUNTY — EMPLOYMENT AND EARNINGS, BY SECTOR, FOR 1992

<table>
<thead>
<tr>
<th>ECONOMIC SECTOR</th>
<th>NUMBER OF UNITS</th>
<th>EMPLOYMENT</th>
<th>TOTAL WAGES</th>
<th>AVERAGE WEEKLY EARNINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>EMPLOYMENT</td>
<td>TOTAL*</td>
<td>PERCENTAGE OF TOTAL*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NO.</td>
<td>$000s</td>
<td>PERCENTAGE OF TOTAL*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>41</td>
<td>663</td>
<td>1,627</td>
<td>2.0%</td>
</tr>
<tr>
<td>Mining — Oil and Gas</td>
<td>96</td>
<td>1,266</td>
<td>9,716</td>
<td>11.7%</td>
</tr>
<tr>
<td>Mining — Non-Metallic</td>
<td>10</td>
<td>2,074</td>
<td>18,355</td>
<td>22.0%</td>
</tr>
<tr>
<td>Construction</td>
<td>125</td>
<td>866</td>
<td>3,851</td>
<td>4.6%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>31</td>
<td>866</td>
<td>7,267</td>
<td>8.7%</td>
</tr>
<tr>
<td>Transportation,</td>
<td>81</td>
<td>1,722</td>
<td>13,355</td>
<td>13.0%</td>
</tr>
<tr>
<td>Communications,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and Utilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>78</td>
<td>470</td>
<td>2,815</td>
<td>3.4%</td>
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<tr>
<td>Retail Trade —</td>
<td>75</td>
<td>1,016</td>
<td>1,812</td>
<td>2.2%</td>
</tr>
<tr>
<td>Eating &amp; Drinking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail Trade —</td>
<td>196</td>
<td>2,139</td>
<td>7,460</td>
<td>8.9%</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Finance, Insurance,</td>
<td>84</td>
<td>587</td>
<td>3,001</td>
<td>3.6%</td>
</tr>
<tr>
<td>and Real Estate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service — Lodging</td>
<td>19</td>
<td>435</td>
<td>968</td>
<td>1.2%</td>
</tr>
<tr>
<td>Service — Other</td>
<td>347</td>
<td>3,033</td>
<td>12,977</td>
<td>15.6%</td>
</tr>
<tr>
<td>Total</td>
<td>1,182</td>
<td>15,139</td>
<td>83,376</td>
<td>100%</td>
</tr>
</tbody>
</table>

* Annual averages, percentages may not add to 100% due to rounding.

Present Economic Impact of the Park

Park’s Annual Operating Budget. Carlsbad Caverns National Park has a significant positive economic impact on the local economy. The park’s budget for fiscal year 1995 was approximately $3,969,000 (see appendix I). The park employs about 90 permanent staff and 31 seasonals. More than $2.6 million of the park’s total budget goes toward employee salaries and benefits. Most of these funds are circulated within the local economy.

Payments in Lieu of Taxes. The federal government is required by law to make payments to local governments based on the acreage of federally owned land located within each county. About 2.7% of the federal land in Eddy County is managed by the National Park Service. In 1994 Eddy County received a total payment of $1,032,438; less than 5% was attributable to the national park. The 1995 payment was $905,316.
Christmas Tree formation in Slaughter Canyon Cave
INTRODUCTION

The discussion of environmental consequences, as required by the National Environmental Policy Act (NEPA), provides a basis for comparing the alternatives and the effects that would result from implementing each alternative, based on a scientific and analytic review of information collected by the Park Service or provided by other agencies. Regulations to implement NEPA require an analysis of the cumulative effects of a proposed action. Cumulative effects (as defined in 40 CFR 1508) refer to "the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

In general, the following impact analysis assumes that existing NPS plans (see "Interrelationships with Existing Plans, Projects, and Acts") will be carried out. The discussion therefore focuses on impacts of new actions proposed in the alternatives (particularly for alternatives 2 and 3) rather than on impacts of carrying out existing plans.

Impact topics were selected for analysis by determining which resources or elements of the human environment would be affected by alternative actions to address the planning issues and concerns described in the "Purpose of and Need for the Plan." Those resources and environmental concerns identified through scoping that would not be affected by alternative actions were eliminated from comparative analysis.

IMPACT TOPICS DISMISSED FROM CONSIDERATION

The following topics were dismissed because no major impacts would result from implementing any of the alternatives.

Cavern Air Quality

Several years of radon 222 monitoring has resulted in an adequate database to determine that radon levels in Carlsbad Cavern are sufficiently below recommended limits. The proposed action or alternative actions would not affect natural radon levels or general air quality in the cavern.

Subsurface Threatened or Endangered Species

The occult little brown bat (Myotis lucifugus occultus) is federally listed as a category 2 species. After years of numerous bat species inventories and bat capture studies, park staff have not identified this bat species in the park. The park would continue to have only marginal habitat for the species, and no impacts are expected.

Local Economic Impacts

None of the alternatives would significantly affect the oil and gas industry. However, precluding or curtailing oil and gas development along the northern border of the park is a likely outcome of proposed BLM actions and the Lechugilla Cave Protection Act. These impacts would not result from any actions proposed in the Final General Management Plan / Environmental Impact Statement, and thus are outside the scope of this document. The likely impacts of those actions are that some individuals would be affected through the loss of oil and gas industry revenues and jobs. The overall effect of this curtailment would be in the range of 1%-2% of the total economic output of the oil and gas industry in Eddy County. The impact on the economic well-being of the county would be negligible.
ENVIRONMENTAL CONSEQUENCES

For the most part, there would either be no or minimal impacts from NPS actions on sectors of the local economy other than tourism (agriculture, manufacturing, etc.).

IMPACTS COMMON TO ALL ALTERNATIVES

The following impacts are common to all alternatives and are not repeated in the impact sections for individual alternatives. These impacts are included in the conclusion for each impact topic for individual alternatives.

Air Quality

Analysis. Some minor disturbance to air quality would result from dust particles being blown into the air during trail clearing and new trail construction. There might be slight increases in air pollutant emissions during the construction, removal, or relocation of buildings, roads, and other facilities under any of the alternatives or subsequent development concept plans. The effects on air quality would be localized and temporary. No state or federal air quality standard would be exceeded. The park staff would employ measures to minimize such impacts.

Conclusion. No long-term impacts would result, and no cumulative effects on air quality are expected.

Soils and Vegetation

Analysis. Areas where vegetation was disturbed as a result of construction (new facilities or areas where underground utilities were replaced) would undergo accelerated erosion until vegetation was reestablished. Interim water runoff in disturbed areas might locally increase erosion and changes in soil nutrient transport. Runoff into adjacent vegetated areas could result in more mesic conditions and altered vegetation composition. Altered vegetative composition could also cause slight changes in soil chemistry.

Conclusion. Minor and local changes in soils and vegetation from erosion and increased water runoff related to construction and rehabilitation are expected.

Water Resources

Analysis. Erosion on disturbed slopes before vegetation became reestablished could result in minor short-term siltation of springs and drainages downstream from development (construction or utility replacement) sites. Scheduling and standard construction contract stipulations for erosion control barriers would be expected to prevent erosion from degrading water quality.

Conclusion. Water quality downstream from construction sites would not be significantly affected by construction or utility replacement.

Archeological Resources

Analysis. Several studies to identify, evaluate, and protect archeological resources have been proposed in the Resources Management Plan. Adverse impacts due to a lack of knowledge about resources would continue pending the funding and final implementation of study recommendations.

The same is true for archeological resource preservation and protection. Adverse impacts to cultural resources would continue to occur until additional educational programs were in place to educate visitors about resource protection, and until staffing levels were increased to provide for effective maintenance, patrols, and monitoring of sites.

Unauthorized artifact collection, vandalism, and looting could result in the loss of diagnostic materials important to the interpretation, evaluation, and protection of sites. With expected
increases in park visitation and more use of park areas, there could be a greater potential for relic hunting and vandalism. This negative effect could be partially mitigated by increases in staff to monitor, stabilize, and protect sites. However, due to the park’s size, configuration, and wilderness areas, many areas are difficult to patrol, and some adverse impacts to archeological resources are likely to continue.

Integrating the Cave Management Plan, Fire Management Plan, and other natural resource management plans with plans for the management of archeological resources would benefit archeological resources.

**Conclusion:** Short-term adverse impacts to archeological resources would continue. Long-term impacts would be mostly mitigated, but some adverse effects would continue.

**Historic Resources**

**Analysis.** The continued adaptive use of historic structures in the Caverns Historic District would ensure continued maintenance for these structures, preserving their individual integrity as well as the character of the district. Managing Rattlesnake Springs as a cultural landscape (particularly with regard to irrigating selected areas and preserving biotic landscape components) would have positive effects on both the historic district and the cultural landscape.

**Conclusion.** Under all alternatives adaptive use of historic structures in the Caverns Historic District would be beneficial. Managing Rattlesnake Springs as a cultural landscape would ensure the long-term protection of this site’s historic resources.

**Ethnographic Resources**

**Analysis.** No adverse effects on ethnographic resources are expected as a result of implementing any alternative. Because resource values were considered early in the planning process, proposed development has been designed to avoid impacts on known ethnographic sites. Managing visitor activities and providing additional educational and interpretive programs would help reduce vandalism and other inappropriate activities that could desecrate sacred sites. Provisions for notifying tribes about management actions would help ensure consistency in the management of ethnographic resources. Also, because of consultation begun during general management planning, positive effects on ethnographic resources are expected under all alternatives. However, because some archeological sites are also sensitive ethnographic resources, the impacts described above for archeological resources would also apply to these resources.

**Conclusion.** Generally, consultation with groups traditionally associated with park lands would help ensure the preservation of ethnographic resources. Some potential exists for negative impacts to archeological sites valued by traditional groups, but these effects would be mitigated by measures described in earlier sections of this document.

**Museum Resources**

**Analysis.** Over the short term a lack of staff and funding would continue to result in the uneven, sporadic management of artifacts, specimens, and archival resources. Additional staff and funding over the long term would allow the collections and archival resources to be curated to minimum standards.

**Conclusion.** Additional staffing and funding would ensure the protection of museum resources.

**Paleontological Resources**

**Analysis.** Paleontological resources are similar to archeological resources in that they are non-renewable, desirable to collectors, and easily
damaged. Unsupervised efforts to enlarge cave openings, unauthorized collecting, trampling of sensitive materials, and looting would all damage specimens, remove them from their context, and destroy their scientific value. Minimal identification and preservation efforts would not totally eliminate threats to these resources.

**Conclusions.** Cave exploration and unauthorized collecting would continue to threaten paleontological resources, with impacts the same as described for archeological resources above.

**Safety**

**Analysis.** The Park Service has developed final procedures for implementing Executive Order 11988, "Floodplain Management," as outlined in Special Directive 93-4, "Floodplain Management Guideline," July 1, 1993. These procedures were followed in this planning effort. Actions under all alternatives would avoid or mitigate adverse impacts associated with the continued occupation of floodplains. In high hazard areas (areas subject to flash flooding), picnic facilities, scenic overlooks, foot trails, and associated daytime parking facilities may be placed within the floodplain, but these facilities must include signs informing visitors of flood risk and suggested actions in the event of flooding. (A flash flood is a flood in which waters rise so rapidly that there is little or no time to warn and evacuate people threatened by the flood). According to regulations, the area subject to flash flooding is the area that would be covered by a probable maximum flood.

Updating the park’s flood emergency response plan would reduce the risk of loss of life to visitors and staff at the Slaughter Canyon trailhead and other areas in the park. Warning signs would be posted in flood hazard areas, and facilities and structures in the probable maximum floodplain would be marked with flood heights. Evacuation routes would be identified as necessary. Although access roads are excepted from compliance with the floodplain regulations, floods could result in minor road damage in Walnut Canyon. The danger to visitors from road washouts and subsequent stranding would be mitigated by the plan.

**Conclusion.** Areas subject to flash floods would be posted and managed in accordance with the park’s emergency response plan. No adverse effects on visitor safety are expected.
ALTERNATIVE 1 — NO-ACTION ALTERNATIVE

IMPACTS ON SUBSURFACE NATURAL RESOURCES

Cave Formations

Analysis. The no-action alternative calls for no changes in current management, visitor use practices, resource protection, or regulatory enforcement in park caves. Carlsbad Cavern would continue to be open to the general public through guided and self-guided tours. No general or recreational public access would be permitted in Lechuguilla Cave. About 10 backcountry caves would continue to have restricted access, and the rest of the backcountry caves within the park would remain closed to public access.

Without protection devices or increased staffing to monitor visitors, vandalism would continue, with an estimated 2,000 speleothems being broken or stolen annually. This would be an irretrievable and irreversible loss of resources.

Fine particulate lint matter (like clothing fibers, hair, soil particles, and discarded skin cells) would continue to be inadvertently deposited by visitors in the cave and on cave formations adjacent to trails. Lint accumulations would continue to degrade the appearance of formations and cause formations to dissolve or to grow unevenly. Lint would also provide an unnatural food source for microorganisms and insect species (Jablonsky et al. 1994). Microorganisms and insect populations would continue to become established because of this unnatural food supply. The effects of lint accumulations and practical control methodology have received little study.

Research and exploration activities would continue to impact Lechuguilla Cave’s pristine condition. Travel in parts of the cave has disturbed dirt and dust, resulting in discolored formations and even larger areas such as the Great White Way (a corridor of crystals). Insufficient resource management staff would be unable to adequately monitor potential damage from research and exploratory parties. The no-action alternative would permit exploration and research trips to continue in Lechuguilla Cave; the risk of damage to resources would increase proportionately with the number of unmonitored trips taken.

Delicate formations in Lechuguilla Cave would continue to be broken or destroyed while new or difficult areas were being explored and mapped. Numerous white or light-colored formations have been marked and discolored because of dirty footprints and handprints. On extended trips, human urine is sometimes deposited within the cave, and the effects of mildly acidic urine on the cave environment are not entirely known. The frequency and extent of past urine deposits, formation breakage, and the spread of dust and discoloration on cave formations has not been systematically monitored; therefore the risk cannot be quantified.

Resource damage occurring in other backcountry caves because of unmonitored use would continue; little or no baseline data has been gathered to determine the magnitude of effects from either unauthorized or permitted entry. Data would continue to be inadequate to assess the extent of changes and damage. The risk of damage to and the loss of backcountry cave resources would increase over time.

Conclusion. Cave formations would continue to be discolored and dissolved. Large numbers of speleothems would be broken in Carlsbad Cavern annually, constituting an irretrievable and irreversible loss of resources. Lechuguilla Cave’s pristine condition would continue to be altered or destroyed. Assessment of damage in backcountry caves would be prevented. The degree of potential damage to all cave resources would increase over time.
Cave Processes

Analysis. Current artificial cave lighting levels and placement in Carlsbad Cavern would continue to stimulate unnatural algae growth, resulting in the discoloration of formations and an unnatural food source for microorganisms and insects.

Hydrocarbon and silicon trail materials would remain within Carlsbad Cavern. A small number of studies have indicated that no leaching of hydrocarbons from fairly new asphalt occurs in wet environments (Asphalt Institute 1991, Kriech 1992). However, no studies have been conducted to determine the effects of asphalt aging and decomposing in semiclosed and humid environments like caves. The effects of the epoxy surface binder and decomposing hydrocarbons on cave processes in the cavern atmosphere remain unknown.

Potential damage to cave resources from hazardous materials would remain. Hazardous materials, such as petroleum products, chemicals, paint removers, lead-based paints, and corrosive acids are used in many maintenance activities, and they are stored in surface facilities directly above Carlsbad Cavern. A materials spill, structural fire, or other misfortune could put unknown quantities of hazardous material directly into the cave system, destroying or altering cave formations and the cave ecosystem. Without protective measures, irreparable damage to the cavern could conceivably occur.

Any leakage from underground sewerlines could also adversely affect cave processes. Two major sewerline breaks have been documented, plus numerous smaller leaks. Most lines in the Caverns Historic District are old and have a high potential for more leaks. The degree to which such leaks could affect cave flora and fauna, and possibly even speleothem/mineral growth, is unknown at this time.

Runoff from vehicle parking areas above Carlsbad Cavern would contain hydrocarbon substances that could enter the cave through subsurface fissures and along bedding planes. These hydrocarbon pollutants could discolor formations and alter or stop some cave development processes. The extent of the potential impact is unknown at this time.

Coins, food products, gum, urine, and other human wastes would continue to be deposited in or near cave pools along visitor trails. Organic and inorganic substances would continue to be transported from the surface by means of infiltration. Foreign substances would still be contained in the effluent from trail cleaning and would drain into pools. These organic and inorganic substances alter water chemistry and deplete dissolved oxygen of standing water within the cavern (USGS, McLean 1971).

Local changes to hydrology and circulation patterns as a result of current cave trail alignment and fill would remain. The pool at Cave Man Junction and Longfellow's Bathtub would remain bisected by trail fill, impeding water circulation in the pool and causing water levels to remain uneven and aesthetically unappealing.

Natural air conditions in Lechuguilla Cave would not be entirely maintained, which could have subtle effects on the cave system.

Conclusion. Unnatural algae growth, which provides an artificial food source for microorganisms and insects, would continue in Carlsbad Cavern. Hazardous materials, sewage, or petroleum byproducts, as well as hydrocarbon and silicon trail materials inside the cavern, could conceivably damage cave flora, fauna, formations, and processes. Dissolved oxygen in cavern water pools would continue to be depleted, and human-caused effects on water pool hydrology and circulation in Carlsbad Cavern would remain. Air conditions in Lechuguilla Cave could be altered somewhat and could have undetermined effects.
IMPACTS ON SURFACE NATURAL RESOURCES

Soils and Vegetation

Analysis. The lack of coordinated management of Guadalupe Ridge lands by the U.S. Forest Service, the Bureau of Land Management, and the National Park Service could lead to surface natural resource management problems in this area, such as illegal cactus collecting and trampling of vegetation and soils.

Backcountry areas and resources within the park would continue to be protected by means of periodic patrols. The potential for illegal cactus collecting would continue without an obvious NPS presence.

The existing use, maintenance, and management of roads, trails, parking areas, picnic areas, buildings, and utility systems would continue to result in minor disturbance of adjacent soils and vegetation. Foot traffic would continue to affect vegetation around cave entrances, picnic areas, trailheads, administrative and maintenance buildings, and scenic and interpretive facilities. Soil loss due to trail compaction, deflation by wind, erosion by water, and rock displacement would continue at about its current rate. Because no new development is proposed under this alternative, there would be no new impacts of this type on soils and vegetation.

Infrastructure rehabilitation, including the replacement of water- and sewerlines above the cavern and resurfacing of the entrance road, would temporarily disturb about 1.4 acres (see table 9).

As a result of regular use and maintenance activities, road aggregate on the Walnut Canyon desert drive would continue to migrate outside the road prism and into undisturbed areas. The impacts would include covering or damaging roadside soils and vegetation.

Conclusion. Existing effects on soils and vegetation from illegal plant collecting, human use, and maintenance activities would continue. Rehabilitating the park’s infrastructure would temporarily disturb soils and vegetation. Long-term significant adverse impacts on park soils or vegetation are not expected.

Wildlife

Analysis. Infrastructure rehabilitation would result in the disturbance or destruction of habitat for some reptiles, small mammals, and ground-nesting birds. Some individuals would fail to successfully adapt to this intrusion and would die. Most reptiles and small mammals would experience only temporary disturbance from construction and would reoccupy the areas once construction activity ceased.

The lack of coordinated management of the Guadalupe Ridge area by the U.S. Forest Service, the Bureau of Land Management, and the National Park Service could lead to continued surface natural resource management problems in that area, including wildlife harassment and poaching and reduced effectiveness of mountain lion management.

The lack of coordination among federal and state agencies regarding the management of Barbary sheep would likely result in continued growth in this nonnative population and greater competition with native species, such as mule deer, for forage in the park. Bighorn sheep that could be reintroduced in the park in the future would also be adversely affected by competition from Barbary sheep.

The protection of backcountry areas and resources, and the monitoring of backcountry use, would continue to be periodic. The potential for wildlife harassment and poaching would continue.

Human-made impoundments at several backcountry springs and seeps would remain,
ENVIRONMENTAL CONSEQUENCES

perpetuating unnatural pooling/water retention at these locations. Local wildlife populations would continue to depend on these water reserves.

Road aggregate on the Walnut Canyon desert drive would continue to migrate outside the road prism and into undisturbed areas, adversely affecting roadside wildlife habitat.

The bat population in Carlsbad Cavern is currently stable, as indicated by monitoring of the evening bat flights. However, the total population has decreased over the past several decades, probably because of pesticides and habitat loss. Observations of bat flight changes due to loud noises, camera flashes, and amphitheater overcrowding are insufficient to determine the effect on bats (NPS, Kerbo, pers. comm. 1993). Trail materials and surface epoxy inside the cavern could be affecting bats or bat nurseries. The degree of risk to bats is unknown and unquantified.

Artificial lighting inside the cavern has allowed cave swallow populations to go beyond the normal twilight zone and into the normally dark zone. The long-term effects of this expansion are not known.

Conclusion. Some wildlife in areas proposed for infrastructure rehabilitation could be adversely affected over the short term. Wildlife harassment, poaching, and competition between native and nonnative species for forage would continue. Insufficient information on bats and swallows would continue to hamper management.

Threatened or Endangered Species

Analysis. This alternative would not reduce the risk of illegal cactus collecting in the park because backcountry resources would be monitored only periodically.

Replacing underground utilities in the Caverns Historic District and repaving the entrance road are not expected to disturb threatened or endangered species, but before construction the Park Service would consult with the U.S. Fish and Wildlife Service to determine whether surveys for such species should be conducted. If protected species were found, appropriate measures would be developed in consultation with the Fish and Wildlife Service to avoid adverse effects.

Conclusion. No adverse effects on threatened or endangered species are expected from utility replacement or road repaving. The potential for threatened or endangered plant species to be illegally collected would continue; in the worst case, such collecting could further endanger the continued existence of these species.

Water Resources

Analysis. Groundwater aquifers in southeastern New Mexico are geographically rare and variable as to seasonal quantity and recharge. Gas well leaks into nearby aquifers have contaminated private water wells 3 miles west of Rattlesnake Springs. Groundwater flow patterns are not well understood, and the frequency and extent of past groundwater aquifer contamination have not been systematically monitored. Therefore, the risk for making the park's water supply unfit for human consumption cannot be quantified.

Any existing groundwater quality threats from leaking gas wells or crop irrigation (from leaching of pesticides and fertilizers) outside the park would continue under this alternative. Agricultural irrigation could also affect groundwater quantity. Inadequate water to meet park needs as a result of shortages or contamination could result. Wells tapping the same aquifer that supplies Rattlesnake Springs would continue to periodically reduce the short-term outflow at Rattlesnake Springs, the park's primary domestic water source. If the aquifer was drawn down far enough, surface water quantity and possibly flora and fauna, wetlands, and the cultural landscape at Rattlesnake Springs could be affected.
Conclusion. The potential for future contamination of the park's domestic water supply from agricultural use, gas wells, and underground natural gas storage would continue. The risk of having insufficient water to fulfill park needs would remain, and water-related natural resources and the Rattlesnake Springs cultural landscape could be negatively affected. There would be no other significant, long-term impacts on surface water resources.

**IMPACTS ON CULTURAL AND PALEONTOLOGICAL RESOURCES**

**Archeological Resources**

**Analysis.** Inventories and evaluations (as staffing and funding allow) would benefit the management of archeological resources by identifying significant sites where protection efforts could be focused. Site-specific investigations and mitigation would help ensure that replacing underground water- and sewerlines in the Caverns Historic District and repaving the entrance road did not adversely affect archeological resources. Long-term negative impacts would probably continue to occur from concentrated visitor use, vandalism, and relic hunting, but these impacts would be partially mitigated by public education programs and limited research and monitoring of resources.

**Conclusion.** Short-term adverse impacts on archeological resources would occur until studies and measures proposed in the park's Resources Management Plan were implemented.

**Historic Resources**

**Analysis.** Removing the temporary modular building behind the visitor center would have a positive effect on the cultural landscape. Inventories and protective measures would ensure that historic resources within the cavern (ropes, steps, trails, artifacts, etc.) would not be disturbed by trail maintenance activities.

**Ethnographic Resources**

**Analysis.** Staffing and funding deficiencies would continue to make it difficult to monitor impacts on ethnographic resources in remote areas, and some negative impacts could occur. As protective measures were undertaken, the potential for negative impacts would be reduced. Continued consultation with Indian tribes would help ensure the protection of ethnographic resources.

**Conclusion.** Short-term adverse effects on ethnographic resources could occur but would be mitigated by protective measures. Consultations with tribes would ensure the protection of sites.

**Museum Resources**

A short-term lack of staffing and funding would result in continuing uneven and sporadic management of these resources.

**IMPACTS ON THE VISITOR EXPERIENCE**

**Cave Access and Circulation**

**Analysis.** In Carlsbad Cavern the no-action alternative would continue the current practice of providing self-guided tours in the Big Room and the Main Corridor. The King's Palace tour would still be guided, as would the Main Corridor tour during the winter months. Guided tours of other caves and off-trail passages would continue to be offered through a reservation system.

**Conclusion.** The preservation of historic buildings in the Caverns Historic District would be ensured. Historic resources in the cavern would be protected. Managing Rattlesnake Springs as a cultural landscape would ensure the protection of resources.
Visitors could continue to choose from a variety of guided and self-guided tour options to best suit their needs. Except when the parking lots filled to capacity, or when the elevator capacity was exceeded, all visitors arriving during operating hours would be able to have some type of cave experience. For self-guided tours the only waits visitors might encounter would be in purchasing tickets or waiting for an orientation talk. Once inside the cavern, they could begin their tours immediately.

The capacity of the visitor center parking lots would determine the number of vehicles that could enter the park on peak days, while the capacity of the elevators would control the flow of visitors (those not using the natural entrance) into and out of the main cavern. Some visitors could be inconvenienced on peak days by having to wait to enter the park or to take the elevator into or out of the cavern. At peak times some visitors might not be able to take the King’s Palace tour, thus missing some of the cave’s spectacular features.

On the self-guided tour routes visitors would likely see continued and increasing damage to cave resources, as well as other visitors violating regulations by leaving designated paths.

**Conclusion.** Except for a few peak days during the year, all visitors desiring to see Carlsbad Cavern would be accommodated and could choose between several guided or self-guided tours. The potential for additional cave resource damage would continue and could affect visitors' enjoyment of the cavern.

**Information, Orientation, and Interpretation**

**Analysis.** Many visitors would continue to get advance park information at area motels and information centers, by radio as they approached Whites City, or at the first pullout inside the park boundary. Others might get insufficient information if they did not stay overnight in the area or stop at area information centers. Also, some visitors might not see the signs for the informational radio broadcasts or realize that the first pullout inside the park contains important information.

Many visitors would benefit from the information kiosks outside the visitor center and from the staffed information desk in the lobby. However, on busy days visitors would continue to encounter congestion and confusion because of the adjacent ticket sales lines.

The orientation talks given by park interpreters would continue to have positive effects on most visitors’ behavior while touring the cave. Presenting these talks, however, would be labor intensive, and the quality and effectiveness would vary from one interpreter to another.

The variety of interpretive activities and media (including personal services) would continue to offer multiple program choices and to accommodate the diversity of park visitors. Crowded conditions on peak days and inefficient visitor flow patterns would continue to interfere with the effectiveness and design of the interpretive media in the visitor center.

Under the no-action alternative gaps in interpretation would continue. There would be little information to convey to visitors the relationships between surface and cave resources, the historical significance of Rattlesnake Springs, and the character and diversity of the Chihuahuan Desert.

**Conclusion.** Alternative 1 would continue to provide some opportunities for visitors to get information and orientation about Carlsbad Caverns and other regional attractions, but other opportunities would not be taken advantage of. Existing space inefficiencies, crowding, and gaps in interpretation would continue to compromise visitors’ experiences.
**Scenic Quality**

**Analysis.** Vehicles and pavement would continue to predominate on the south side of the visitor center. Visitors would have difficulty finding a pleasant vantage point from which to enjoy far-off views. Removing the temporary building on the north side of the visitor center would make the building a bit less imposing when seen from the Caverns Historic District, but it would still dominate the scene. The cavern entrance area development would remain visible from U.S. 62/180 to the south.

**Conclusion.** Scenic quality atop the escarpment would not be substantially improved, and visitors would still have difficulty finding suitable places to enjoy panoramic views. Existing views in other areas of the park would not change appreciably.

**Safety**

**Analysis.** A major spill or fire in the maintenance area could result in hazardous materials, such as petroleum products, chemicals, paint removers, lead-based paints, corrosive acids, or runoff containing these substances, entering the cavern. These materials could cause visitors and park staff who were in the cavern at the time of an accident respiratory problems, severe burning, or death. Such an accident could also result in the closure of the cavern for an indefinite period.

**Conclusion.** Danger to persons in the cavern from a hazardous material spill or leak in the park maintenance area would continue.

**SOCIOECONOMIC IMPACTS**

**Analysis.** The risk of hazardous or other materials affecting the main cavern would continue under alternative 1. If an extraordinary event occurred that resulted in the cavern being closed for public safety reasons, the tourism industry and local economy would be negatively affected. If the required closure lasted for several weeks or months, the effect on many local businesses could be devastating.

Aside from such an event, the local tourism industry would not be substantially affected in the short term. Carlsbad Caverns would remain a destination park for day use. Park visitors would continue to seek and obtain goods and services from the private sector in Whites City and Carlsbad. However, continuing the existing management direction would not adequately address many of the problems confronting the park today. Over the long term unacceptable resource degradation would occur, and many visitors would be inadequately served. The result would be a park that could not adequately fulfill its intended purposes, including the protection of irreplaceable resources and service to the American public.

**Conclusion.** No short-term change in ongoing socioeconomic impacts are expected, unless the cavern had to close for public safety reasons. Over the long term failure to protect resources would result in continued degradation that would lessen the quality of visitor experiences and could negatively impact the local tourism industry.

**CUMULATIVE IMPACTS**

For more than 50 years, increasing annual visitation has resulted in changes to Carlsbad Cavern. The effects of some changes are negligible and others are noticeable, but efforts have not been initiated to measure most of the alterations. The lack of baseline information could lead to decisions being made without a full understanding of potential impacts, resulting in unforeseen detrimental effects on visitors, cave resources, or both. Projections indicate that visitation to Carlsbad Cavern is likely to increase over time; thus impacts on the cavern would also increase. Without more protection, cavern formations would continue to be degraded. The cumulative impacts of exploratory and research trips in Lechuguilla Cave would increase with each party entering the cave.
ENVIROMENTAL CONSEQUENCES

No long-term cumulative effects on soils and vegetation are expected under this alternative.

This alternative could adversely affect the perpetuation of some native species, such as bighorn sheep, and the integrity of their communities. Disturbances of bats by visitor and vehicular noise during evening bat flight, and potentially by hydrocarbons inside the cave, would continue. These effects would increase over time, with an unknown effect on the bat population.

This alternative is not expected to result in the loss of critical habitat for threatened or endangered species, nor would it adversely affect the viability of any threatened or endangered species.

Agriculture is expanding, and future water needs for irrigation would increase the demands on a limited groundwater supply, potentially adversely affecting park domestic needs. Future agricultural irrigation from above Rattlesnake Springs could expand the leaching of pesticides, fertilizers, and herbicides through the soil layers and into the groundwater, potentially contaminating the water supply for the park.

Cultural and paleontological resources have been previously damaged or destroyed by guano mining, relic hunting, looting, and construction activities. These activities damaged irreplaceable resources and destroyed scientific evidence through the undocumented removal or disturbance of objects and features from their original context. Under this alternative activities such as relic hunting and looting would probably continue, and might even increase if demand for such items by private collectors increased. Once these resources were removed or damaged, it might be impossible to accurately date the remains or recover valuable scientific information. Over time such activities would reduce the number and quality of sites and specimens, and there would be a cumulative impact on the sites and on the data base, reducing and skewing scientific information.

With the continued loss of cave resources, the visitor experience at Carlsbad Caverns would begin to deteriorate, possibly resulting in a negative reflection on the ability of the National Parks Service to effectively manage cave resources.

Scenic quality in the cavern entrance / visitor center area has been gradually degraded by the incremental addition and enlargement of buildings and other facilities. Under alternative 1 this trend could continue, resulting in further degradation of scenic quality in the future.

Continued damage to cave resources could result in a decline in the park's prominence as a major visitor attraction, which could have a negative effect on regional tourism and the local economy.
ALTERNATIVE 2 — PROPOSED ACTION

Under alternative 2 decisions to move major facilities off the escarpment to protect cave resources would be made only after the ongoing infiltration/hazard study had been completed (see the “General Development” section of alternative 2). The impacts of those decisions would be addressed in detail in a separate development concept plan.

IMPACTS ON SUBSURFACE NATURAL RESOURCES

Cave Formations

Analysis. An increase in staff for guided tours would allow a greater NPS presence and better visitor education about resources, which would help reduce breakage and theft of formations. Statistics on damage to formations indicate that vandalism and theft increase when there are fewer NPS staff and visitors in the public areas of the cavern. An increase of NPS staff at key locations within the Big Room, which visitors would see on self-guided tours, would allow more personal interpretation of resource values and possibly help eliminate vandalism in some areas.

Visitor education programs and media would include interpretive messages with a strong resource protection theme. Greater public awareness about the effects of touching formations, vandalism, foodstuff, coins, off-trail travel, and human waste products would help reduce the discoloration and destruction of formations. Reduced touching of formations in the cavern would decrease skin oil on formations, thus allowing natural growth processes of speleothems.

Some adverse impacts would be unavoidable with visitor access. Current monitoring focuses only on the numbers of formations that have been vandalized or stolen. Under this alternative various methods to reduce the effects of visitors on cave resources would be studied and more effective methods implemented. This information would be supplemented by the visitor experience/resource protection (VERP) study, which would help identify additional ways to reduce adverse impacts on cavern resources. This process would also identify acceptable limits of change to the cave environment and provide the means for measuring, evaluating, and eliminating unacceptable levels of adverse impacts.

Trail realignment activities might damage some minor formations such as flowstone and small stalagmites immediately adjacent to the trail.

In-cave experiments would be conducted to determine and implement the best method or combination of methods to reduce or eliminate lint deposition. Reducing the amount of lint in the cavern would result in less discoloration and dissolution of cave formations and would remove a major source of artificial habitat and food supply for exotic cave organisms, thus helping restore a more natural cavern environment.

An increase in cave resource management funds and staff would enable NPS staff to accompany more parties entering Lechuguilla Cave. The presence of NPS personnel would reduce the discoloration of formations from touching and the breakage of formations from inappropriate entry into delicate areas. A restoration plan would help identify priorities and methods for addressing past impacts to Lechuguilla Cave. Additional cave management staff would allow photo-point stations to be established, which would provide baseline documentation to measure future changes.

An ongoing study would determine the need for and feasibility of providing additional public access to Ogle Cave, and it would analyze the impacts of such access and protective requirements. The study would make recommen-
ENVIRONMENTAL CONSEQUENCES

dations as well as assess impacts and describe mitigating measures.

The proposed action would seek resources to apply existing guidelines and to initiate regular backcountry cave inspections. Such measures would help reduce formation damage and theft because of unauthorized entry in backcountry caves; also, illegal entry would be eliminated in some backcountry caves. Backcountry caves and cave resources would be inventoried to establish a baseline for future comparison, and monitoring methods would be established to measure unauthorized entry as well as human-caused and natural changes to cave resources. Gates would prevent further adverse impacts at all backcountry caves needing increased protection.

Future studies would determine the nature and extent of actions to protect cave resources and to ensure a quality visitor experience. Some actions would be deferred pending the completion of special studies and experiments to establish a scientific basis for decisions; adverse effects during this interim period could be unavoidable and result in irreversible and irretrievable losses. The best measures to reduce impacts would be adopted in more detailed development concept plans or implementation plans before specific actions were carried out.

The management of Guadalupe Ridge lands in cooperation with the U.S. Forest Service and Bureau of Land Management would improve cave protection in general along the entire escarpment.

Conclusion. The long-term impacts of proposed actions under this alternative would be beneficial. However, some actions would be deferred pending the completion of special studies and experiments to establish a scientific basis for decisions. Adverse effects during this interim period could be unavoidable, resulting in irreversible and irretrievable losses. In Carlsbad Cavern breakage and theft of formations would be greatly reduced; however, trail realignment activities might damage some minor formations.

There would be less discoloration and dissolution of cave formations. Illegal entry, damage, and theft would decrease in backcountry caves. Resource protection in Lechuguilla Cave would be improved. A future study would assess the need, feasibility, and protective requirements for additional public access to Ogle Cave.

Cave Processes

Analysis. The impacts of prohibiting additional impervious structures above Carlsbad Cavern would be primarily beneficial and would prevent additional potential effects from sewage leaks, contamination from parking areas, or further alteration of natural water infiltration into the cavern.

The impacts of realigning certain trail sections and providing physical barriers to protect delicate formations would be primarily beneficial. Trails would be realigned in certain cases to avoid formations and water pools where possible, thus allowing severed water pools to be reconnected and speleothem development processes to continue unimpeded by visitors touching active formations.

A new lighting system would help reduce alterations to active speleothems caused while maintaining lights that are difficult to reach. Specific impacts as a result of the new trail and lighting system would be evaluated separately after the completion of future studies and an evaluation of recommendations.

Improvements to trail cleaning and washing techniques, based on experiments conducted under this alternative, would be expected to reduce or stop emery chips and other foreign materials from being dispersed along trails. Alternative techniques such as brushing trails and washing with lower water pressure would be experimented with.

Catchment traps or filters at runoff areas in the cave would reduce or eliminate the dispersal of
trail surface materials, such as emery chips into off-trail areas. It would also reduce contamination from other surface debris, from visitor-carried dirt and other foreign materials on shoes, and from lint, coins, and food particles on the trail surface.

Removing or sealing hydrocarbon trail materials would eliminate unsightly decomposing asphalt. Studies and experiments would determine ways to eliminate emery chip materials from being scattered along the trail corridor. Other studies and experiments would determine new materials that have similar attributes to cave materials or would result in minimal adverse effects on the cave environment.

The removal of old trail asphalt or sealing the asphalt in place under new materials would also eliminate potential effects of decomposing hydrocarbons on the cavern environment. No studies have been done to determine what the effects of hydrocarbon/asphalt/epoxy resin breakdown are, if any, so impacts cannot be quantified at this time.

Trails in the cavern would be realigned to reconnect bisected water pools where possible. Reconnecting bisected pools would restore natural water circulation.

The water quality of pools within the cavern would be improved with programs to keep coins, food products, gum, urine, and other human wastes from being deposited in pools. These actions would help to partially or completely restore dissolved oxygen within pools along visitor trails. Organic and inorganic substances transported from the surface through infiltration would be substantially reduced. Foreign substances in the effluent from trail cleaning would be reduced, contained, and would no longer affect water pools.

An infiltration/hazard study would examine and recommend ways to prevent or mitigate potential adverse effects on cave resources and processes. Any major spills that occurred before the study recommendations were implemented could result in irretrievable and irreversible damage. Hazardous substances could destroy or change cave formation or deposition processes.

Improving the Lechuguilla Cave airlock/culvert would reduce any abnormal air exchange, as well as humidity loss in the cavern. No baseline information exists upon which to quantify the decrease in humidity loss or other effects that would result from taking this measure.

**Conclusion.** Proposals under this alternative would be beneficial to cave processes. Potential effects from sewage leaks, parking area runoff and infiltration, along with altered infiltration patterns into the cavern, would be eliminated. The potential for visitors to touch formations and alter cave deposition processes would be reduced. Damage to or alteration of speleothems from lighting system maintenance would be reduced or eliminated. The contamination of off-trail areas from runoff water would be reduced, and foreign materials would no longer be scattered along the trail corridor. A study of infiltration patterns and hazardous materials used and stored above the cavern (and their potential effects on cave processes in the event of an accident) would help managers decide how to prevent or mitigate adverse effects, including irreversible or irretrievable damage.

Potential effects of decomposing hydrocarbons from trail materials on the cavern environment would be eliminated. Natural conditions, and consequently the appearance of the cavern, would be improved. The water quality of cavern pools would be improved. The abnormal air exchange would be reduced or eliminated at Lechuguilla Cave.
IMPACTS ON SURFACE NATURAL RESOURCES

Soils and Vegetation

Analysis. Improved inventory and monitoring programs would allow better management of plant resources. The management of Guadalupe Ridge lands in cooperation with the U.S. Forest Service and Bureau of Land Management would result in improved surface resource management and protection along the entire escarpment.

Increased interpretive staff, improved public interpretive programs and seminars on research and resource management, and environmental education programs would raise visitor awareness of desert surface resources (such as soils, vegetation, and wildlife) and encourage greater participation in resource stewardship and protection programs.

Parkwide impacts from facility and trail development would result in minor disturbance to soils and vegetation, but no significant long-term effects would result. Proper design of facilities would minimize resource damage and help facilities blend with the surrounding environment. The construction and rehabilitation of facilities would disturb 3.1 acres of native vegetation and soils (1.3 acres would be permanently disturbed, 1.8 acres temporarily). Table 9 shows a detailed breakdown of disturbed acreages.

Constructing or improving roads, trails, parking areas, and structures would also reduce water percolation into soils. Grading and paving would compact soils. Site leveling for trails, parking areas, and structures would alter soil profiles and soil development processes. The organic content of topsoils would be reduced by mixing during construction. Topsoil removed from areas to be covered by pavement or buildings would be used to make up any shortages at other sites, thus minimizing overall soil losses. During trail construction special measures would be taken to mitigate impacts in areas where the slopes were steep and the soils were easily eroded (see mitigating measures under the description of alternative 2 for park roads and trails).

Foot traffic on new trails would result in increased impacts in adjacent areas; more surface vegetation, such as small cacti, would be subject to trampling or illegal collecting. The primary impact on soils would be compaction, which would decrease permeability, locally alter soil moisture, and diminish water storage capacity. A change in soil moisture might alter the relative abundance of some species and affect germination. Nonnative plants, such as Johnson grass, star thistle, and common cocklebur, could invade disturbed areas, becoming more prevalent around developments. In compacted areas greater surface runoff would increase erosion potential. This might lead to exposed root systems and the death of more mesic plants. The impacts of trampling could range from the complete destruction of vegetation to slight alterations in species composition. Similar impacts would occur along road shoulders, where vehicles would crush vegetation and compact soil.

Rehabilitating the Walnut Canyon desert drive would result in decreased impacts on adjacent soils and vegetation. However, more vehicular use on the improved road could result in increased trampling of roadside vegetation and illegal cactus collecting.

Providing a ranger residence on the road to Slaughter Canyon would allow improved resource management, better monitoring of backcountry use, and reduced resource impacts, including impacts from illegal cactus collecting.

Conclusion. Improved inventory and monitoring activities, increased cooperation among federal agencies, better protection in backcountry areas, and increased awareness as a result of interpretive programs would have beneficial effects on soils and especially vegetation. Overall, the net adverse impact on park plant populations and soils from development and use would be minimal and localized; there would be no significant long-term adverse impacts.
### Table 9: Net Impacts on Soils and Vegetation (Acres)

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<tr>
<td></td>
<td>Permanent</td>
<td>Temporary</td>
<td>Permanent</td>
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<tr>
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<tr>
<td>Ranger residence</td>
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<td>0.1</td>
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<tr>
<td>Entrance road pullout</td>
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<td>0.3</td>
<td></td>
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<tr>
<td>Geologic interpretive trail</td>
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<td>1.3</td>
<td>1.8</td>
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<tr>
<td>Reclamation/Removal of Facilities above Cavern</td>
<td>***</td>
<td>***</td>
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</tr>
<tr>
<td>Net Acres Permanently Affected</td>
<td></td>
<td>1.3***</td>
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</tbody>
</table>

* Need and feasibility studies required.
** Replace water- and sewerlines.
*** Full impact not quantified because actions would depend on the results of the infiltration/hazard study and a future final decision.

### Wildlife

**Analysis.** Strengthened inventory and monitoring programs would allow more informed management of wildlife resources.

Managing the Guadalupe Ridge lands in cooperation with other federal agencies would improve the protection of wildlife resources along the escarpment. Resolving conflicting policies with other agencies regarding exotic Barbary sheep, which could include its delisting as a game species, could result in more consistent management and the eventual removal of the species from the area. This would result in decreased competition for forage among native species such as mule deer, elk, and possibly bighorn sheep if reintroduced in the future.

Increased interpretive staff and improvements to interpretive programs, educational programs, and seminars would increase public knowledge about wildlife and encourage greater participation in related stewardship and protection programs.
ENVIRONMENTAL CONSEQUENCES

Proposed development and associated visitor use would disturb or destroy the habitat of some ground- and tree-dwelling invertebrates, mammals, and birds, causing death or relocation. Some individuals would fail to successfully adapt to this intrusion and die. Most reptiles and small mammals would be temporarily affected and would reoccupy areas once construction activity ceased.

It is unlikely that constructing a kiosk at the park entrance and repaving the park entrance road would affect a pair of golden eagles nesting in the area, but as a precautionary measure these projects would be scheduled to avoid the eagles’ nesting season. New impacts to wildlife would be minimal because these areas are already disturbed. Improving the Walnut Canyon desert drive would reduce or eliminate ongoing detrimental effects to adjacent wildlife habitat.

Removing human-made impoundments at backcountry springs could, in the short-term, affect local wildlife because a dependable water supply would become unavailable; however, no significant long-term effects are expected.

Providing a ranger residence on the road to Slaughter Canyon would help reduce the threat of poaching in backcountry areas. However, the loss of vegetation and increased human presence at the residence could reduce food availability for some wildlife, including mule deer, javelina, and quail.

A new cavern lighting system would potentially reduce or eliminate cave swallow nesting beyond the twilight zone in Carlsbad Cavern.

Conclusion. Wildlife would benefit over the long term from improved inventory and monitoring, cooperation among federal agencies, better protection in backcountry areas, increased visitor awareness through interpretation, and improvement of the Walnut Canyon desert drive. Some wildlife in the area of the proposed ranger residence could be adversely affected, but no significant long-term adverse impacts on wildlife species or their habitat are expected.

Threatened or Endangered Species

Analysis. The illegal collection of threatened or endangered plant species would decrease because of an increased NPS presence and improved resource protection in the backcountry, as well as increased visitor awareness.

Constructing a trail to Ogle Cave (in the event that the cave was opened to guided tours) is not expected to affect peregrine falcons. Peregrines are occasionally seen in the vicinity of Slaughter Canyon, but are not believed to have nested there because of marginal habitat.

Indications from 1995 field surveys are that threatened or endangered plant species would not be affected by either the proposed ranger residence near Slaughter Canyon or a new park operations facility near the base of the escarpment (if proposed by a future development concept plan).

Detailed threatened or endangered plant surveys for the geologic interpretive trail and the (possible future) Ogle Cave trail would be conducted once these trail routes were better defined. If protected plant species were found along these trail routes, the routes would be modified before construction, and other mitigation measures would be developed in consultation with the U.S. Fish and Wildlife Service so that protected plants would not be adversely affected.

Before beginning any construction or road rehabilitation, the Park Service would consult with the Fish and Wildlife Service to determine whether additional surveys for threatened and endangered species should be conducted. If any were found during future surveys, the Park Service would develop appropriate measures in consultation with the Fish and Wildlife Service to avoid adverse effects.
**Conclusion.** Some beneficial effects on threatened and endangered species due to proposed programmatic actions would be likely. Proposed actions are not likely to adversely affect proposed, threatened, or endangered species.

**Water Resources**

**Analysis.** Groundwater quality would be improved over the long term if the Park Service successfully worked with adjacent landowners to eliminate or mitigate negative effects from farmland irrigation runoff or gas well leaks.

In compliance with Executive Order 11990, “Protection of Wetlands,” no development would be located in, and no actions would affect, wetlands. The proposed future study for Rattlesnake Springs would include recommendations for preserving the cultural landscape in ways that would not negatively affect the stream/wetland system, and that might enhance the area’s wetland values.

No proposed actions would have significant effects on the flood regime downstream or the moderation of floodwaters.

**Conclusion.** Groundwater quality in the area would be improved. No significant negative impacts on water resources, including floodplains or wetlands, would result.

**IMPACTS ON CULTURAL AND PALEONTOLOGICAL RESOURCES**

**Archeological Resources**

**Analysis.** Eight archeological sites have been documented in the general vicinity of the cavern, 24 more along the Walnut Canyon desert drive, and 12 sites scattered along the base of the escarpment in the general vicinity of the sewage pond road. Most of these sites could be avoided by properly placing development, and they would not be affected by construction activities.

Site-specific investigations and appropriate mitigations as previously described would help ensure that no archeological resources would be adversely affected during trail construction, replacement of Putman cabin, or repaving of the entrance road. Because some sites were bisected by the original Walnut Canyon road, mitigation could be necessary to prevent additional damage during resurfacing of the road.

No known archeological sites would be affected by constructing a ranger residence near Slaughter Canyon, and the presence of NPS facilities would benefit resources by deterring vandalism and looting.

Some long-term negative impacts would probably continue to occur from concentrated visitor use, vandalism, and relic hunting, but these impacts would be reduced by public educational programs and by research and monitoring of resources.

With the inventory, documentation, and protective measures (including avoidance) described earlier, no adverse impacts on prehistoric and historic resources in Carlsbad Cavern are expected as a result of realigning or rehabilitating trails or installing lighting or lint containment traps. Installing gates on backcountry caves would help prevent adverse impacts on cultural resources in the caves.

Managing Rattlesnake Springs as a cultural landscape could affect archeological resources through ground disturbance (e.g., removing or adding new plantings, cultivation, or maintaining the irrigation system). These impacts would likely be limited in scope and mitigated through inventory and data recovery. Generally the lack of major developments and concentrated visitor use in this area would benefit resources.

**Conclusion.** Most archeological sites could be avoided during construction. Short-term adverse impacts would occur pending the completion of studies and the implementation of measures proposed in the park’s Resources Management
ENVIRO\NMENTAL CONSEQUENCES

Plan. The loss of resources from looting and illegal collecting would probably continue, but at a much lower rate.

Historic Resources

Analysis. Modifications to the exterior of the visitor center and the surrounding landscape would make the building more compatible with the cultural landscape. Sensitive redesign of the interior would respect and avoid any further disturbance of remaining historic elements of the original structure, so no adverse impacts are expected.

Historic structures that are contributing elements of the Caverns Historic District would remain in place. However, removing noncontributing residential and maintenance structures and maintenance facilities could adversely affect the cultural landscape, changing its appearance and function. Adaptive use of the headquarters building for environmental education could require extensive interior modifications, but previously described mitigations would reduce adverse effects.

A full analysis of specific impacts and decisions regarding the treatment of the buildings and landscape features under this alternative cannot be made until the infiltration/hazard study (now underway) has been completed and a development concept plan has been prepared. During the study period, all existing structures and landscape features would continue to be maintained. Appropriate compliance with section 106 of the National Historic Preservation Act would be completed during the development concept planning phase.

Opening the Ogle Cave complex for tours could affect historic guano mining features through increased risk of unauthorized collecting of artifacts, straying off paths, or vandalism. Such activities could destroy sensitive resources and their context, compromising the archeological integrity and scientific value of the historic site. However, guided tours and an increased ranger presence in Slaughter Canyon would help identify potential problems before serious impacts occurred. The interpretation of guano mining history would help visitors appreciate and understand these resources and aid in resource protection. Protective measures described for this alternative would reduce or eliminate adverse effects.

The coordination of natural and cultural resource management actions would reduce the potential for adverse impacts on cultural resources in the backcountry. Because breaching historic dams at backcountry springs and returning these areas to natural conditions could damage the integrity of historic resources and diminish an area’s research potential, mitigating measures would be necessary to prevent adverse effects.

Conclusion. Modifications to the visitor center would have a beneficial effect on the surrounding landscape. Historic resources in Carlsbad Cavern would be protected. With mitigation, historic resources in the backcountry would not be adversely affected. Effects from opening Ogle Cave to visitation would be mostly mitigated through other protective measures. Managing Rattlesnake Springs as a cultural landscape would ensure the protection of resources.

Museum Resources

Analysis. Providing adequate space and appropriate climatic conditions in the existing visitor center for collections and archives, and hiring additional staff to ensure full accountability for collections, would help ensure the long-term preservation of artifacts, specimens, and archival resources.

Conclusion. Artifacts, specimens, and archival resources would be better protected and managed under this alternative.
Ethnographic Resources

Analysis. Measures outlined in this alternative, including continued consultation among the National Park Service, the Mescalero Apache, the Ysleta del Sur Pueblo, and the Zia Pueblo would benefit the management of ethnographic resources. Occasional negative impacts to archeological resources held sacred by groups with cultural ties to the area could occur.

Conclusion. Consulting with culturally affiliated groups would help preserve ethnographic resources. Occasional negative impacts could occur to archeological sites.

Paleontological Resources

Analysis. Identifying and appropriately managing paleontological resources would help ensure their preservation. Some long-term effects could occur from vandalism or inadvertent destruction during caving activities, but these would be minimized by mitigating measures described previously.

Conclusion. Paleontological resources would be protected, and long-term negative effects would be minimized.

IMPACTS ON THE VISITOR EXPERIENCE

Cave Access and Circulation

Analysis. Under this alternative the Big Room could eventually be the only self-guided cave tour route in the park. All other tours, possibly including the Main Corridor (the natural entrance route), would be guided by park interpreters. If feasible, Ogle Cave would be opened for guided tours. Reservations would be required for most guided tours, and limits on the number of people per tour would continue.

Visitors would benefit by being able to opt for a self-guided tour of Carlsbad Cavern or a variety of guided tours. Guided tour options would offer a range of cave experiences, from easy strolls to rigorous scrambles. Visitors would be able to get more in-depth and personalized interpretation on guided tours. Protecting cave resources and offering a high-quality visitor experience would be the primary criteria in determining the optimum number of people per tour.

Visitors with limited time or who could not be accommodated on guided tours because they were full would still be able to see the Big Room and possibly the Main Corridor, but would miss out on some of the cave’s spectacular features. Some of these visitors might decide to spend the night in the area to see more of the cave.

Visitors wishing to take guided tours might experience long waits for their reserved time; however, these visitors would be informed of other activities and programs that would broaden their park experience and fill the time until their cave tours began. Except when the parking lots were full or the elevator capacity was exceeded, all visitors arriving during operating hours would be able to have some type of cave experience.

The guided tours plus additional resource protection measures along the Big Room tour route would significantly reduce resource damage and enhance the visitor experience.

Conclusion. Except for a few peak days during the year, all visitors desiring a cave experience would be accommodated and could choose between guided or self-guided tours. The increased emphasis on guided tours of sensitive areas, plus additional security measures in the Big Room, would result in less cave damage being apparent to visitors.

Information, Orientation, and Interpretation

Analysis. Visitors would benefit from more signs, which would give information about the park and direct people to area facilities where they could obtain more detailed information.
ENVIRONMENTAL CONSEQUENCES

Overnight visitors would benefit from park information broadcasts on cable television channels in their rooms. Better roadside signs for the park radio broadcasts would encourage more visitors to use this system for park information.

Additional information provided near the park entrance would be another means to better inform visitors about visiting the park and touring the cavern.

The redesign of the visitor center would separate the fee collection operation from the information desk, making it easier for visitors to distinguish between the two operations and to get their questions answered.

Presenting the cave orientation talks by means of an audiovisual program would free park interpreters for other duties and ensure that all visitors got the same message. The program would incorporate techniques to elicit positive visitor behavior in the cavern.

A bigger variety of interpretive activities and media (including personal services) would offer multiple program choices and accommodate diverse park visitors. Redesigning the visitor center would result in improved visitor flow, better identification and organization of exhibit areas, and a more thorough presentation of park themes. This could encourage more visitors to explore the park’s aboveground resources (e.g., the Chihuahuan Desert and Rattlesnake Springs).

Conclusion. On a regional level, alternative 2 would increase opportunities for visitors to get current, accurate park information and to become oriented to Carlsbad Caverns and other tourist attractions in the area. Visitors would be well prepared to enjoy the park in an efficient, safe, and environmentally conscious manner. Visitors would be better able to understand and appreciate park resources.

Scenic Quality

Analysis. Modifications to the visitor center’s exterior and outdoor spaces would bring the building down to a more human scale, lessening its impact from some viewpoints. Improvements could include covering portions of the building’s facade with stone, which would make the building more visually congruent with the surrounding landscape and with buildings in the Caverns Historic District (as well as more in keeping with the original, smaller visitor center structure of the 1940s).

Removing the temporary building on the north side of the visitor center would make the visitor center look slightly less massive when seen from the Caverns Historic District and amphitheater. Development in the vicinity of the cavern would remain visible from U.S. 62/180 to the south.

A shaded overlook next to the entry plaza and the geologic interpretive trail overlook would provide new vantage points for visitors to enjoy long-range views, which is important for understanding how and why caves formed in the escarpment. These facilities would not detract from the scenic quality of the area. Scenic quality within the park could improve because some existing signs on the Walnut Canyon entrance road might no longer be needed.

The new information kiosk near the park boundary in Whites City would not significantly affect scenic quality in the Whites City area. The kiosk would be located in or around existing development, and it would be designed to be visually compatible with that development.

The new Slaughter Canyon ranger residence would visually intrude somewhat on the Slaughter Canyon environs. This structure would be one of few passed by visitors on their way to the Slaughter Canyon trailhead. The ranger residence would also be visible from portions of a potential new trail to Ogle Cave, which would be constructed if Ogle Cave was opened to guided tours. The careful use of materials, archi-
tectural styles, and native landscape plantings would help the structure blend with the natural setting and lessen the visual impact.

Every effort would be made to minimize cuts and reduce the visibility of a new trail to Ogle Cave from Slaughter Canyon and the trailhead.

**Conclusion.** This alternative would improve visual quality near the cavern entrance/visitor center area. It would detract slightly from scenic quality along the entrance road and near the mouth of Slaughter Canyon. Opportunities for visitors to see the surrounding landscape would be significantly improved.

**Safety**

**Analysis.** Over the long term the proposed action would reduce or eliminate the risk of a major hazardous spill or fire in the maintenance area having harmful or deadly impacts on people in Carlsbad Cavern.

Guided tours of Carlsbad Cavern’s Main Corridor, if deemed necessary, would increase safety and reduce the need for rescues and visitor assists on the steep portions of the trail.

Evaluating and improving the Lechuguilla Cave airlock/culvert would increase safety for authorized Lechuguilla explorers and researchers.

**Conclusion.** The safety of visitors, park staff, and others would be improved.

**SOCIOECONOMIC IMPACTS**

**Analysis.** Risks to the main cavern from a gas leak or infiltration of hazardous materials would remain over the short term, until measures to reduce such risks that could be proposed in the future development concept plan were implemented. If an extraordinary event occurred that resulted in the cavern being closed for public safety reasons, the tourism industry and local economy would be negatively affected. If the required closure lasted for several weeks or months, the effect on many local businesses could be devastating.

Barring a significant accident or hazardous material effect on the cavern, Carlsbad Caverns National Park would continue to be a mainstay of the local tourism industry over the long term. Improving the visitor experience, better serving and informing visitors, enhancing public safety, and ensuring the long-term protection of park resources would all contribute to the stability of the local tourism industry.

Some short-term economic benefits would accrue to the local economy due to construction and development activities; these impacts would occur during the life of the projects, then cease. Long-term economic benefits would result from a larger staff (seasonal and permanent) and an increasing park operating budget.

The local tourism industry would not be significantly affected in the short term by possible changes in cave tours. Visitors would continue to seek and obtain goods and services from the private sector in Whites City and Carlsbad.

**Conclusion.** The local economy would benefit over the both the short and long term, provided hazardous materials or other effects did not result in a closure of the cavern before such risks could be eliminated. The park would continue to be a mainstay of the local tourism industry. Sustainability of this industry would be enhanced because park resources would be better protected and visitor experiences enhanced.

**CUMULATIVE IMPACTS**

The continuation of ongoing NPS and volunteer efforts to rehabilitate discolored formations, combined with a reduction or elimination of further human-caused damage, would permit some cave formations to be restored over the very long term.
ENVIRONMENTAL CONSEQUENCES

Some rare, and as yet unexplained, cave processes are found in few other locations in the world. The proposed actions would help perpetuate the integrity of individual and interrelated speleological processes and would have a positive cumulative effect from a global perspective over time. Cave-related studies would provide additional baseline data and a better understanding of the interactive components of this unusual underground environment. This information would contribute to worldwide knowledge about caves.

Certain wildlife species and the integrity of their communities would be perpetuated, and certain nonnative species would be eliminated; this would have a positive cumulative effect on a regional scale. No cumulative impacts on bats or swallows are expected.

Cooperative management of threatened or endangered species by the U.S. Forest Service and the Bureau of Land Management, in conjunction with the National Park Service, educational and outreach programs, and improved backcountry monitoring would help protect soils, vegetation, and threatened/endangered species' habitat in the Guadalupe escarpment region.

There would be no adverse cumulative effects on natural flooding regimes, wetlands, or other water resource values.

In the past cultural and paleontological resources have been damaged or destroyed by guano mining, relic hunting, looting, and construction activities both inside and outside the park. Relic hunting and looting would probably continue in the future under the proposed action, but to a lesser degree than now occurs. Cultural and paleontological sites and related databases would continue to be negatively impacted, but the cumulative effect on the sites and the scientific information base would be less than under alternative 1.

Alternative 2 would stop or possibly reverse the gradual degradation of scenic quality in the cavern entrance / visitor center area that has resulted from the incremental addition of buildings and facilities that are not compatible with the cultural and natural setting. The cumulative effect of adding facilities in dispersed locations would be to make evidence of human occupation more widespread, at least in the park’s frontcountry.

Eddy County has experienced significant economic growth and diversification in the past few years. Governmental services and private industry have contributed to the economic health and viability of the area. A cumulative effect of this alternative is that expanded park funding, budget, programs, and workforce would contribute to the continuing stability of the local economy. However fluctuations in the oil and gas industry or other segments of the local economy might overshadow the stabilizing effects of the park.

Growth of the local economy due to new businesses locating in Carlsbad is increasing the demand for housing. Houses are available in Carlsbad, but the average price has been rising. The market for rental units is very tight because demand exceeds supply. Relocating some permanent employees from park housing (which could be called for in the future development concept plan) and hiring new employees would further increase the demand for housing. In the short term the housing market would continue to be limited by the available supply; house prices and rental unit prices would rise. Some employees might have difficulty finding affordable housing that is suited to their requirements. Rising prices for available housing would encourage the private sector to respond by providing more housing units. In the long run, more housing would be built to satisfy the increased demand.
UNAVOIDABLE ADVERSE IMPACTS

Minor damage and vandalism to speleothems would occur in all park caves, even with the most sophisticated monitoring technology and NPS staff deployment. Developing or modifying trails and visitor safety features in Carlsbad Cavern and potentially Ogle Cave could result in minor changes to some formations or formation development processes. Exploration, surveying, research, and documentation of unexplored areas of known caves (such as Lechuguilla Cave) or as yet undiscovered caves would lead to some minor damage or discoloration of speleothems and cave aesthetics. Interim adverse effects on cave formations (from present facilities or activities) that occurred before recommendations of proposed studies could be implemented would probably be unavoidable.

Approximately 1.3 acres of soils/vegetation/wildlife habitat would be permanently affected (see table 9). This area could increase if park facilities were moved off the escarpment. Habitat would continue to be committed to park infrastructure/development and associated features, and unavoidable impacts in some previously undisturbed areas would occur.

Some archeological sites and artifacts could be unavoidably affected by looting and vandalism.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible commitments of resources include the destruction or use of nonrenewable resources such as cave formations and cave minerals. NPS staff would protect all resources to the extent possible; however, significant features would have a higher priority, and the protection of other formations would depend on staffing and the limitations of mechanical protective measures. Some cave formations and related features would still be damaged by vandalism, construction, and routine maintenance, resulting in irreversible losses of minor formations; however, the levels of such effects, particularly from vandalism, would be reduced.

The irretrievable commitment of resources applies to the uses of renewable resources that are lost because the proposal allocates these resources for other uses. The proposed use of some areas within cave environments for visitor access trails and facilities would, in a practical sense, be an irretrievable commitment of resources.

There would be some irretrievable commitments of soils and vegetation caused by trail construction and facility development. Some reduction in available wildlife habitat would also be unavoidable; however, mitigation measures would help offset the direct losses caused by facility and trail development.

Although all archeological sites would be avoided where possible, or disturbance would be mitigated through the recovery of cultural information and significant artifacts. Some losses of archeological objects and cultural information would be likely due to vandalism, relic hunting, or construction activities. These losses would be irretrievable and irreplaceable.
ALTERNATIVE 3

IMPACTS ON SUBSURFACE NATURAL RESOURCES

Cave Formations

Analysis. Impacts would be similar to those described under alternative 2. Staff deployment in the cavern and the use of barriers, sensors, and monitoring systems would reduce but not eliminate visitor damage to formations.

Resurfacing the visitor trail with more appropriate material would remove potential effects from decomposing hydrocarbon materials. Trail realignment activities could damage some minor formations such as flowstone and small stalagmites immediately adjacent to the trail.

Using the most effective means (or combination of means) to stop lint deposition — electrostatic collectors, air blast techniques, or partial enclosures — would have a beneficial effect on the cave.

NPS personnel accompanying research and exploratory parties in Lechuguilla Cave would reduce general cave damage, speleothem discoloration, and formation breakage. No data have been collected to quantify the extent of damage. Some areas of Lechuguilla that have been damaged in the past would be restored or rehabilitated. Monitoring of visitor impacts to Slaughter Canyon Cave would help prevent serious damage there. Impacts to other backcountry caves would be the same as for alternative 1.

Conclusion. Damage to cave formations would be reduced but not eliminated. Trail realignment activities would damage an undetermined number of minor formations. Reducing lint in the cavern would have a beneficial effect. Accompanying research and exploratory parties in Lechuguilla Cave would reduce damage.

Cave Processes

Analysis. Removing active uses of historic structures over Carlsbad Cavern, relocating maintenance activities, and prohibiting future development in this area would eliminate the risk of contaminants or hazardous materials from entering the cave as a result of a surface spill, leak, accident, or catastrophic event. Discontinuing the use of sewerlines would eliminate the potential for infiltration of sewage into the cave.

Trapping and containing trail-washing effluent would reduce the adverse effects of contaminant runoff in the cave. The exact amount of contaminants that would be removed is not known at this time.

Removing existing trail surface materials would eliminate potential effects of decomposing hydrocarbon materials on the cavern. The use of a new trail material would eliminate potential adverse effects from the dispersal of emery chips along trail corridors as a result of high-pressure washing and visitor traffic.

Trapping and containing runoff and using shuttles to transport visitors to the evening bat flight programs would reduce potential adverse effects to the cave (such as formation discoloration) from petroleum byproducts, including gasoline, motor oil, and antifreeze. Vehicle fluid spills and lubricant drips have not been measured, but they may contaminate water that infiltrates into the cavern.

Conclusion. The risk of hazardous substances entering the cavern would be eliminated. Replacing the trail surface would reduce the risk of harmful effects. The adverse impact of contaminant dispersal in the cave caused by routine maintenance activities would be reduced or possibly eliminated. Potential adverse effects on the cavern from motor vehicle contaminants would be reduced.
**IMPACTS ON SURFACE NATURAL RESOURCES**

**Soils and Vegetation**

**Analysis.** Impacts of alternative 3 would be the same as for alternative 2 with the following exceptions.

Providing a staffed visitor contact station at the Slaughter Canyon trailhead would result in improved monitoring of backcountry use and overall reduced resource impacts, including impacts from illegal cactus collecting.

Acreages for soils and vegetation affected by development actions under this alternative are given in table 9. The construction and use of facilities associated with actions described under alternative 3 would impact approximately 58.5 acres (20.6 acres permanently and 37.9 acres temporarily). General impacts from development and visitor use would be the same as for the proposed action except that development and resulting impacts would be concentrated at the base of the escarpment.

Removing development near the cavern entrance area atop the escarpment and eliminating parking at the existing visitor center would allow the recovery/restoration of a total of 11.3 acres of soils and vegetation and a reduction in erosion problems. All revegetation efforts would use native plant species. Areas temporarily disturbed during construction would be restored to their natural grade and replanted or reseeded with native species to speed the rate of recovery and minimize the encroachment of invading species. This restored area would partially offset the 20.6 acres that would be permanently affected by relocating NPS and visitor operations to the base of the escarpment.

Road gravel on the Walnut Canyon desert drive would continue to migrate outside the roadbed into undisturbed areas as a result of regular use and maintenance. This would cover or damage roadside soils and vegetation.

**Conclusion.** Increased cooperation among federal agencies, better protection in backcountry areas, and increased visitor awareness through interpretation would have a beneficial impact on soils and plants. Existing localized impacts to soils and vegetation along the Walnut Canyon desert drive would continue over the long term. Significant, long-term adverse impacts on plant populations and soils from development and use are not expected.

**Wildlife**

**Analysis.** Impacts on wildlife would be similar to alternative 2, with the following exceptions.

Providing a staffed visitor contact station at the Slaughter Canyon trailhead would result in improved backcountry management and resource protection, including reduced wildlife harassment and poaching. However, human presence at a new visitor contact station, NPS operations center, and orientation/transit center would reduce food availability and habitat for some wildlife species, including mule deer, javelina, and quail.

Increased human activity near the existing sewage ponds could also adversely affect the use of the ponds by ducks, bats, and other wildlife.

Road gravel on Walnut Canyon desert drive would continue to migrate outside the roadbed into undisturbed areas during regular use and maintenance, disturbing or destroying habitat for ground-nesting birds, small mammals, and reptiles.

**Conclusion.** Wildlife would benefit over the long term from increased cooperation among federal agencies for resource management, better resource protection in backcountry areas, and increased visitor awareness through interpretive programs. Existing impacts on wildlife from the Walnut Canyon desert drive would continue. Forage and habitat for some wildlife species would be reduced by proposed facility construction.
ENVIRONMENTAL CONSEQUENCES

Threatened or Endangered Species

Analysis. Impacts under alternative 3 would be the same as those for alternative 2, with the following exceptions.

A preliminary field survey for threatened or endangered plants in the vicinity of the proposed Slaughter Canyon contact station and the orientation/transit center was conducted in 1995. Facility construction is not likely to adversely affect proposed, threatened, or endangered plant species in this area.

Before any construction or trail improvements were begun, the Park Service would consult with the U.S. Fish and Wildlife Service regarding the need for additional studies for threatened or endangered species. If any species were found during future surveys, the Park Service would develop appropriate measures in consultation with the Fish and Wildlife Service to avoid adverse effects.

Conclusion. Some beneficial effects would occur, but impacts to archeological resources would require extensive mitigation, and some impacts could not be entirely avoided.

Water Resources

Analysis. Impacts on surface and groundwater resources would be the same as for alternative 2, with the following exceptions.

The new staffed visitor contact station at the Slaughter Canyon trailhead and portions of the new access road near Walnut Creek for the proposed orientation/transit center would be within the probable maximum floodplain.

Constructing a bridge spanning the Walnut Canyon drainage and an access road into the new visitor operations area would be excepted actions under Executive Order 11988, “Floodplain Management.” Executive Order 11990, “Protection of Wetlands,” requires federal agencies to avoid, where possible, impacts on wetlands. During the design stage of the proposed development, the most recent floodplain and wetland maps would be consulted, and the bridge would be sited to avoid wetlands.

Conclusion. Groundwater quality would be improved. Some facilities would be within the probable maximum floodplain, but no significant negative impacts on water resources, including floodplains or wetlands, are expected.

IMPACTS ON CULTURAL AND PALEONTOLOGICAL RESOURCES

Archeological Resources

Analysis. Most short- and long-term impacts would be the same as described for alternative 2, with the following exceptions.

Archeological resources would benefit from more structured visitor use. The potential for indirect impacts of visitor use on archeological sites along the entrance road would be slightly reduced by implementing a transportation system.

The potential for archeological resources below the escarpment to be affected would be increased because of road construction and improvements and the construction of a bridge and two major facilities in an area now known to be rich in historic and prehistoric resources (based on 1994 survey information). Because of limited space to build the bridge and access road to the visitor orientation/transit center, it might not be possible to avoid major portions of these archeological sites. Depending on the amount of disturbance and the location of facilities, extensive mitigation measures could be necessary to recover scientific data and prevent adverse impacts.

Conclusion. Some beneficial effects would occur, but impacts to archeological resources would require extensive mitigation, and some impacts could not be entirely avoided.
Historic Resources

Analysis. Most impacts would be the same as alternative 2. If no compatible uses could be found for some of the Caverns Historic District structures, their overall maintenance and upkeep would tend to decline, and they could deteriorate. If visitors perceived a lack of NPS presence in the historic district, incidents of vandalism and informal trails would likely increase, resulting in adverse effects. Removing structures and other facilities (including two maintenance buildings) that do not contribute to the significance of the historic district would adversely affect the present landscape setting.

Conclusion. Alternative 3 could have negative impacts on historic structures and would negatively affect the historic setting and the cultural landscape of the Caverns Historic District. Managing Rattlesnake Springs as a cultural landscape would ensure the protection of resources.

Museum Resources

Museum resources, artifacts, and specimens would be better protected and managed, the same as alternative 2.

Ethnographic Resources

As described for alternative 2, continued consultation with American Indian groups would have positive effects on ethnographic resources, with a potential for negative impacts on archeological resources.

Paleontological Resources

Impacts would be positive, as described for alternative 2.

IMPACTS ON THE VISITOR EXPERIENCE

Cave Access and Circulation

Analysis. Under this alternative only guided cave tours of limited size would be offered. Tours would be confined to the public areas of Carlsbad Cavern, and tours by reservation would be offered of Slaughter Canyon Cave. All off-trail tours would be eliminated in the interest of protecting cave resources. Cave tours would resemble commercial tour opportunities available at other caves in the country.

Visitors would benefit from more personalized and in-depth interpretation on guided tours. Guided tours, in combination with fewer visitors and better control of their movements, would greatly reduce adverse human-related impacts on cave resources, resulting in a better visitor experience. Visitors, however, would not be able to choose among a variety of off-trail cave tours.

Conclusion. Closer supervision of visitors through guided tours, and the elimination of off-trail tours would maximize the protection of cave resources while still allowing for visitor use. The current diversity of visitor experiences would be reduced, and limited tour sizes might prevent all visitors from being accommodated on peak days.

Information, Orientation, and Interpretation

Analysis. As described for alternative 2, increased signs and networking with representatives of the tourism industry would help get advance park information to visitors.

Off-site tour reservations would ensure that visitors making advance plans would be able to take a cave tour at a specified day and time. Once all tours were full, some visitors would be denied entry until a later time. Others with limited time might forgo visiting the park altogether. Increased signs and information systems would
ENVIRONMENTAL CONSEQUENCES

help alert visitors in the region of the need to make reservations and possibly avoid disappointment and driving out of their way. Visitors who did arrive without reservations could check on tour availability at the new orientation/transit center at the base of the escarpment.

Because the park information and orientation function would be moved to the base of the escarpment and visitors would take shuttle buses to the cavern entrance, some visitors would feel inconvenienced. The shuttle system might also add to the time needed to visit the park. Shuttle stops at pullouts along the entrance road could encourage more visitors to spend time exploring the Chihuahuan Desert.

Moving the information and orientation functions into a new facility would make additional space in the visitor center available for more in-depth interpretation of park themes and resources.

A staffed visitor contact station near the mouth of Slaughter Canyon would give backcountry users an opportunity to talk directly with a park ranger, and it would ensure that both day and overnight users had the necessary permits.

Conclusion. Information and orientation would be more readily available to visitors, and interpretive programs would provide more in-depth opportunities.

Scenic Quality

Analysis. The overall scale of development in the cavern entrance area would be reduced by remodeling and reducing the size of the visitor center, and removing parking areas, two maintenance buildings, and the mid-1960s housing units. As a result, facilities in this area would appear to be more in keeping with the natural setting from most perspectives. Providing shuttle bus access to the visitor center and remodeling the visitor center to accommodate fewer functions would offer visitors more opportunities to enjoy the surrounding landscape and panoramic views from indoors and outdoors. Modifications to the building’s exterior would make the entry more inviting and slightly improve its compatibility with the surrounding landscape. Removing the temporary building behind the visitor center would slightly improve the view from the north.

Neither the new orientation/transit center near Whites City nor the new NPS operations center at the base of the escarpment would be visible from existing development atop the escarpment, nor would they be visible from the Walnut Canyon entrance road. Both new developments would create a linear zone of disturbance along the base of escarpment that would be visible from some far-off stretches of U.S. 62/180. (A different soil color is apparent in the vicinity of the existing sewage ponds; the new operations and transit/orientation centers would extend this zone of disturbance to the east.)

The visibility of new developments would persist until plants around facilities were reestablished and other adjustments were made to help screen particularly prominent structures. Buildings and parking lots would be carefully sited and designed, and materials would be chosen to blend into the escarpment background. Using native desert plants in landscaping would minimize contrasts that would otherwise occur if nonnative species were used.

The orientation/transit center access road would be designed to maximize interesting views of natural features such as the escarpment, riparian vegetation, and the Chihuahuan Desert. Visitors arriving at the center would see a more natural landscape than departing visitors because of the area’s topography and the presence of facilities in Whites City.

The NPS operations center to the west and nearby sections of U.S. 62/180 to the east would be hidden from the transit/orientation center by intervening high ground. Utility lines near the transit/orientation center and NPS operations center would be buried so as not to intrude on the scene.
The new staffed visitor contact station at Slaughter Canyon would intrude on the visual scene near the trailhead, although its impact would be lessened by using materials, architecture, and native plants that would blend with the natural setting.

**Conclusion.** This alternative would significantly improve the visual quality of development atop the escarpment, and it would permit visitors to more easily enjoy long-range views of the surrounding landscape. New facilities off the escarpment would not detract from views from the top, but some negative visual impacts from other areas would be unavoidable.

**Safety**

**Analysis.** Impacts would be the same as for alternative 2, with the following exception. The staffed visitor contact station at Slaughter Canyon would provide a means to ensure that both day and overnight users had taken the necessary safety precautions.

**Conclusion.** Safety would be improved for both visitors and park staff.

**SOCIOECONOMIC IMPACTS**

**Analysis.** Improving the visitor experience, better serving and informing visitors, enhancing public safety, and ensuring the long-term protection of park resources would all contribute to the stability of the local tourism industry.

Eliminating off-trail tours could lead to shorter stays and possibly fewer visitors. Some losses to the local economy could result, at least in the short term.

Some short-term positive economic benefits would accrue to the local economy due to construction and other development activities in the park. These impacts would occur during the life of the various projects and then cease. Long-term economic benefits would result from a larger staff (seasonal and permanent) and an increasing park operating budget.

The introduction of a visitor transit system would add to the cost of park operations, but some long-term positive economic impacts from the maintenance of the shuttle fleet and the creation of additional jobs would accrue to the local economy.

Under this alternative concession services would be removed from the present visitor center and provided off the escarpment, possibly at the new visitor orientation center. Providing food and gift facilities about 7 miles from the main cavern would have several consequences. A substantial capital investment would be required if a concessioner had to build a new food service facility and gift shop near the orientation/transit center. Additional costs would be incurred for installing infrastructure such as storage and office space, and for providing security for the facilities during closed hours. Some potential customers might find such a location for business less attractive and would therefore bypass it, reducing the concessioner’s business.

Regardless of whether new food service and gift shop facilities were provided by a concessioner at the orientation/transit center, commercial enterprises at Whites City would probably benefit. This effect would be much greater if food and gift services were not provided at the orientation/transit center, however, because most visitors who would otherwise have made purchases on the escarpment would make them at Whites City.

**Conclusion.** Benefits to the local economy would probably be reduced over the short term. Some positive effects to the local economy would also be expected, primarily from a shuttle system and by removing concession services from the escarpment. Improving the visitor experience, enhancing public safety, and ensuring the long-term protection of park resources would mean that Carlsbad Caverns National Park would
continue to be a mainstay of the local tourism industry.

CUMULATIVE IMPACTS

The cumulative impacts would be the same as for alternative 2, with the following exceptions.

A visitor experience that conforms to that offered in most commercial caves in the nation would be provided.

The gradual decline in the visual quality of the cavern entrance/visitor center area would be partially reversed by removing human-related impacts and restoring several areas.

Constructing the transit/orientation center and park operations center near the existing sewage lagoons would create a linear zone of disturbance along the base of escarpment that would be apparent from some far-off stretches of U.S. 62/180.
Regulatory Compliance Actions, Consultation and Coordination

Entrance, Double Cave
REGULATORY COMPLIANCE ACTIONS

NATURAL RESOURCES

Section 7 of the Endangered Species Act, as amended (16 USC 1531 et seq.), requires all federal agencies to consult with the U.S. Fish and Wildlife Service to ensure that any action authorized, funded, or carried out by an agency does not jeopardize the continued existence of listed species or critical habitat. The Fish and Wildlife Service, which implements the Endangered Species Act, has been consulted regarding effects on endangered, threatened, and candidate species (see appendix J). Consistent with the environmental review coordination provision of 50 CFR 402.06, this environmental impact statement provides the information for and serves as a biological assessment.

As part of the consultation process, the Park Service has sought concurrence from the U.S. Fish and Wildlife Service through a biological opinion about the environmental impact statement’s determination of effect on endangered, threatened, and candidate species. The Park Service will continue to consult with the Fish and Wildlife Service regarding the need for future threatened and endangered species surveys before beginning construction or rehabilitation activities. If such species we found, the Park Service would develop and implement appropriate measures in consultation with the Fish and Wildlife Service to ensure that protected species were not adversely affected.

It is NPS policy to provide similar protection for federal category 2 candidate species, as well as any state listed species. Consultation with the New Mexico Department of Game and Fish and the New Mexico Energy, Minerals and Natural Resources Department, Forestry and Resources Conservation Division, concerning these species has been initiated.

If it becomes necessary to modify the park’s sewage treatment system, the National Park Service will apply to the New Mexico Environment Department Groundwater Pollution Prevention Section for a groundwater discharge permit, as required under part 3 of the regulations of the New Mexico Water Quality Control Commission.

In accordance with the Clean Water Act, a section 404 permit from the Army Corps of Engineers, with concurrence from the U.S. Fish and Wildlife Service, is required for the discharge or placement of fill material into waters of the United States. It is the conclusion of the Park Service that the proposed action would not involve the discharge or placement of fill.

Park roads, foot trails, and associated day parking areas, sanitary facilities, and picnic areas are excepted from compliance with Executive Order 11988, “Floodplain Management,” under NPS final implementation procedures as outlined in Special Directive 93-4, “Floodplain Management Guideline,” July 1, 1993. Additional and more detailed floodplain mapping is needed for Walnut Canyon, Slaughter Canyon, and Rattlesnake Springs to fully comply with this executive order. Warning signs and an emergency flood response plan will be developed by park staff for all floodprone areas of the park. During the design stage for any development, the most recent floodplain maps will be consulted, and new structures will be sited to avoid the 100-year floodplain, unless the activity is excepted.

Executive Order 11990, “Protection of Wetlands,” requires federal agencies to avoid, where possible, impacts on wetlands. No known wetlands would be affected under the proposed action. The proposed future study for Rattlesnake Springs would include recommendations to preserve the cultural landscape that would not impact the stream/wetland system; if that was not possible, a statement of findings would be prepared in accordance with NPS guidelines for implementing Executive Order 11990.
The Storm Water Rule (Clean Water Act, PL 95-217, sec. 402) requires a national pollution discharge elimination system (NPDES) permit for certain categories of stormwater discharge. Road reconstruction that involves clearing and grading activities on more than 5 acres on a particular project require an NPDES permit. Before applying for the permit, the Park Service will work with the state to prepare a site-specific stormwater pollution plan and to identify the best management practices to minimize air and water pollution. During design, consultation with the New Mexico Environmental Improvement Division will ensure compliance with this and the state’s 401 water quality certification program.

Federal agencies are to minimize the effect of federal programs in converting prime, unique, or locally important farmland to nonagricultural uses. According to the Soil Conservation Service (1971), prime and unique farmlands are located on a portion of the Rattlesnake Springs unit within the Rattlesnake Springs Historic District. These lands would not be adversely affected.

Section 118 of the Clean Air Act, as amended (42 USC 7401 et seq.), requires all federal facilities to comply with existing federal, state, and local air pollution control laws and regulations. Carlsbad Caverns National Park will work with the city of Carlsbad and the state of New Mexico to ensure that all in-park activities meet all requirements.

The alteration of existing facilities or the construction of new facilities will comply with applicable laws and regulations pertaining to solid and hazardous waste management, including the Resource Conservation and Recovery Act of 1976, which regulates ongoing hazardous waste generation, handling, disposal, and storage, as well as the storage of petroleum and related products in above- or belowground tanks.

During the removal of any structures, a hazardous waste/substance survey will be conducted to determine if demolition would either cause the creation of a hazardous waste or cause the release of hazardous substances to the environment from within the structure or from anywhere on the property. Any ground disturbance, such as earth moving, geophysical or other subsurface investigation, or major landscaping, areas will be visually inspected for evidence of soil or ground contamination by any pollutants, contaminants, or hazardous substances. If any such contamination is found, appropriate notification/remedial action will be taken to ensure compliance with all applicable U.S. Environmental Protection Agency, state, and local government laws and regulations.

CULTURAL RESOURCES

The National Park Service is mandated to preserve and protect its cultural resources — through the organic act of August 25, 1916, and through specific legislation such as the Antiquities Act of 1906, the National Environmental Policy Act, and the National Historic Preservation Act of 1966. Cultural resources in Carlsbad Caverns National Park will be managed in accordance with these acts, the NPS Management Policies (chapter 5), the Cultural Resources Management Guideline (NPS-28), the Advisory Council on Historic Preservation’s implementing regulations (“Protection of Historic Properties,” 36 CFR 800), and the Secretary of the Interior’s Standards and Guidelines for Archeology and Historic Preservation (48 FR 44716-40). Other relevant policy directives and legislation are detailed in NPS-28.

As part of its cultural resource management responsibilities, the Park Service surveys and evaluates all cultural resources on lands under its jurisdiction. Cultural resources are evaluated by applying the criteria for the National Register of Historic Places. All cultural resources in the park eligible for the national register will be recorded according to the highest professional standards.

Before any ground-disturbing action is taken in the park, a professional archeologist will determine the need for an archeological inventory or testing evaluation. Any such studies will be
carried out before or in conjunction with construc-
tion and will meet the needs of the state his-
toric preservation officer as well as the Na-
tional Park Service. Any large-scale archeolog-
ical investigations will be undertaken in consultation 
with the state historic preservation office.

Section 106 of the National Historic Preserva-
tion Act requires that federal agencies consider the 
effect of their actions on national register 
properties and allow the Advisory Council on 
Historic Preservation and the state historic pre-
servation officer an opportunity to comment. The 
Park Service will work with these entities to meet 
the requirements of 36 CFR 800 and the July 
1995 programmatic agreement among the 
National Conference of State Historic Preser-
vation Officers, the Advisory Council on Historic 
Preservation, and the Park Service. Under this 
agreement the Park Service works closely with 
the state historic preservation officer and the 
advisory council in planning for new and existing 
NPS areas, and allows for their review of the 
project task directive, policy review draft, and 
draft and final documents.

This agreement also allows programmatic exclu-
sions for specified actions that are not likely to 
have an adverse effect on cultural resources. 
Such actions may be implemented without 
further review by the state historic preservation 
officer or the advisory council if the Park Service 
determines during internal review that the actions 
meet certain conditions. Undertakings not spe-
cifically excluded in the programmatic agreement 
must be reviewed by the state historic preser-
vation office and the advisory council during the 
design stage and before implementation.

The Park Service will complete an assessment of 
effect on cultural resources (XXX form) before 
implementing any proposed actions in order to 
document any project effects, outline proposed 
mitigations, and document that the proposed 
action flows from the general management plan. 
All implementing actions for cultural resources 
will be certified by cultural resource specialists, 
as specified in NPS-28.

to ensure that proposals being considered in this 
document comply with the provisions of section 
106, the Advisory Council on Historic Preserva-
tion and the New Mexico state historic preser-
vation officer were invited to participate in the 
planning process. The state historic preservation 
officer and the advisory council were invited to 
review the Draft General Management Plan / 
Environmental Impact Statement.

Programmatic exclusions and actions requiring 
further review in this general management plan 
are listed in appendix B. As the plan is imple-
mented, site-specific information on proposed 
actions and affected properties will be submitted 
for review to the state historic preservation 
officer and the advisory council. These actions 
are summarized in appendix B, including actions 
that are either programmatic exclusions or that 
are subject to further consultation with the state 
historic preservation officer and the advisory 
council. In the interim, no potentially historic 
property will be permanently changed without 
consulting with the state historic preservation 
officer and the advisory council.

Various laws, rules, and regulations deal with 
American Indian relationships. An ethnographic 
study at Carlsbad Caverns, under the supervision 
of Dr. Adolph Greenberg, has helped define the 
presence and general location of ethnographically 
sensitive areas within the park and has also 
helped the Park Service gain an understanding of 
Indian concerns. Representatives from Carlsbad 
Caverns National Park and the NPS Southwest 
Regional Office, along with Dr. Greenberg, have 
met with the Mescalero Apache, the Ysleta del 
Sur Pueblo, and the Zia Pueblo to discuss con-
tinued access for religious purposes, traditional 
use of resources, protection of sites, and facility 
development. Only one major archeological site 
was identified in the ethnographic study as being 
of concern. Protective measures for that and 
other ethnographic sites are discussed in the 
park’s Resources Management Plan and further 
outlined in this Final General Management Plan 
/ Environmental Impact Statement.
Tribes have several other concerns, as indicated in interviews during the ethnographic study and subsequent meetings. They would like to see public access to certain sacred sites restricted; they would like written notification of changes in management policy or treatment of resources; they would like a moratorium on archeological investigations; they want no destructive analysis of human remains; and they would like to have a formal written policy regarding tribal access to the park for ceremonial and gathering purposes. Such consultations, conducted on a government-to-government basis, are expected to continue.

The Draft General Management Plan / Environmental Impact Statement was sent to the above tribes for their review. Other tribes that were given an opportunity to review the plan include the Jicarilla and Chiricahua Apache, the Kiowa, the Comanche, and the Pueblo of Isleta (Northern).

The 1993 amendments to the National Historic Preservation Act provide the means whereby information about the character, location, or ownership of archeological sites, historic properties, and ethnographic sites, including shrines and other religious places, might be withheld from public disclosure. This provision is especially important in cases where disclosure could risk harm to resources or impede the use of a traditional religious site by practitioners. Park managers will honor Indians' requests for confidentiality of information received as part of ongoing surveys.

The American Indian Religious Freedom Act provides for the preservation of the rights of Indians to practice their traditional beliefs. It also provides for consultation with Indian groups in planning and management activities that affect them. The Park Service will develop and accomplish its programs in a way that shows respect for the religious beliefs, traditions, and other cultural values of the Indian tribes who have ancestral ties to the park. The Park Service will also strive to ensure privacy for American Indians to pursue religious activities without interference or inappropriate observation by those who want to learn about Indian ways.

NPS training programs will cover the etiquette to be followed when park staff encounter religious activities or sites and offerings. Continued consultation with American Indian groups will help improve understanding and achieve common goals. Consultation is especially critical to reach mutually acceptable solutions to questions of archeological excavations, resource preservation, and visitor use. All possible measures will be taken to resolve differences so park plans and actions respect the cultural and ethnographic context of sites.

Protective measures will be taken for any discovery of significant archeological resources. Park managers will establish a prompt and effective notification system to contact and consult with concerned groups regarding the discovery of human remains. Managers will deal with burials on a case-by-case basis and with informed awareness of tribal concerns. Burials and sacred objects will be afforded the utmost respect, and the National Park Service will consult with tribes regarding remains associated with these groups.

SPECIAL POPULATIONS

Any new visitor or employee facilities and alterations to existing facilities will comply with applicable laws and regulations, including the 1968 Architectural Barriers Act and the 1972 Rehabilitation Act. Interpretive media and programs will comply with the Programmatic Accessibility Guidelines for Interpretive Media (NPS 1991b). All actions will also comply with the NPS Management Policies, which state, “to the greatest extent possible, commensurate with physical limitations, the handicapped should be able to enjoy the park using the same facilities as the nonhandicapped visitor. Special interpretive facilities and programs for handicapped people are encouraged where good potential for participation is indicated.”
CONSULTATION AND COORDINATION

COORDINATION WITH OTHER AGENCIES

In March 1993 the NPS planning team met with the representatives of the Bureau of Land Management (Roswell District) and the U.S. Forest Service (Lincoln National Forest) and subsequently concluded that the actions proposed in the Final General Management Plan / Environmental Impact Statement could be accomplished without a change in park boundaries. The team's recommendations were sent to NPS management.

More recently, Deputy Regional Forester R. Forrest Carpenter, in a memorandum to the BLM Roswell district, requested that the bureau withdraw 24,740 acres of land within Lincoln National Forest from mineral lease. The purpose of this withdrawal is to protect the Guadalupe Escarpment wilderness study area, pending congressional action on several proposals, including a proposal to establish a Guadalupe Caves natural geological area.

REVIEWERS OF THE DRAFT GENERAL MANAGEMENT PLAN / ENVIRONMENTAL IMPACT STATEMENT

The following governmental agencies, Indian tribes, and organizations were sent copies of the draft document and invited to comment. See page 164 for a list of those agencies, organizations, and individuals who submitted written comments.

Federal Agencies
Advisory Council on Historic Preservation
Department of Agriculture, Forest Service, Lincoln National Forest
Department of the Interior
Bureau of Land Management
United States Fish and Wildlife Service
Environmental Protection Agency

American Indian Tribes
Chiricahua Apache
Comanche
Isleta (Northern) Pueblo
Jicarilla Apache
Kiowa
Mescalero Apache
Ysleta del Sur Pueblo
Zia Pueblo

New Mexico State Agencies
Historic Preservation Office
Energy, Minerals and Natural Resources Department
Environment Department

Local Agencies
Eddy County Board of Commissioners

Organizations and Associations
Carlsbad Caverns/Guadalupe Mountains Association
Carlsbad Chamber of Commerce
Cavern Supply Company, Inc.
National Parks and Conservation Association
Nature Conservancy
Sierra Club
Washington Ranch
White's City, Incorporated
Wilderness Society

COMMENTS AND RESPONSES

A notice of availability of the draft document was published in the Federal Register on November 15, 1995 (60 FR 57454-57545). Approximately 190 copies of the draft were distributed to governmental agencies, public interest groups, businesses, media, local libraries, and individuals.

Written comments were initially accepted through January 16, 1996, which was the close of the 60-day public comment period for the draft document. However, the comment period was
extended to March 25 due to the government shutdown and to respond to citizens who felt they had insufficient notice of the availability of the plan or insufficient time to comment. In addition, an open house was held in the city of Carlsbad on February 15, 1996, to solicit public input. Notice of the open house was published in local newspapers.

A total of 22 people attended the public open house. Organizations that were represented included the Carlsbad Department of Development, the Carlsbad Chamber of Commerce, and the Cavern Supply Company (park concessioner). Although a wide range of views and topics were addressed at the open house, there was clear support for the proposed action. A few people voiced concern over the funds that would be needed to implement the alternative in a period of declining federal spending.

A total of 29 written responses were received on the Draft General Management Plan / Environmental Impact Statement from federal and state agencies, private groups and organizations, and individual citizens. All of these comments, as well as oral comments from the public meeting, are included in this section, along with NPS responses to all substantive comments. (Responses were not prepared for comments that only expressed opinions or did not need a text clarification, correction, or modification.) Some comments required text revisions, which have been made in this Final General Management Plan / Environmental Impact Statement; these changes are noted in the NPS responses. All page number citations refer to the Draft General Management / Environmental Impact Statement. It is important to note that the selection of the proposed action is not based solely on how many people support a particular alternative.

Public Meeting Comments and Responses

The following comments were made at the open house held in Carlsbad, February 15, 1996. The recorded comments have not been edited.

**Comment:** Put some realistic political and economic boundaries around the proposed plan and consider how that affects what could realistically be accomplished.

**Response:** The purpose of a general management plan for Carlsbad Caverns is to set forth the general direction and management philosophy the National Park Service intends to pursue in managing the park over the next 10 to 15 years. In preparing the plan, the planning team looked at current park obligations and needs, as well as future needs, recognizing that budgets are tight today and that there are shortfalls in the park’s current operational programs. Political and economic forces could affect implementation of the plan, but it is not possible to predict how these forces would change over the life of the plan. General management plans do not guarantee funding, but rather provide the rationale and priorities for future funding requests. Most of the management actions in alternative 2 are necessary to achieve the Park Service’s mission and the purposes for which Carlsbad Caverns National Park was established. Because funds would not be available to implement all of the proposed management actions at once, actions were prioritized in three phases (see page 192 of the draft document). Additional options were identified if funding and staffing for some elements were unavailable (see page 63).

**Comment:** Look at the NPS reorganization and consider how it affects the ability of the NPS to carry out the proposed action.

**Response:** The Park Service’s reorganization should not adversely affect the park staff’s ability to implement the proposed plan. Operational matters will be handled by the park staff as in the past. National program centers will still be available to help plan, design, and build facilities. The Southwest Systems Support Office is also available to provide support to the park if needed. The goals of the reorganization are to shift
resources and staff to parks, to improve the management efficiency of parks by reducing organizational overhead, and to eliminate unnecessary reviews of plans and operations.

**Comment:** Write into the plan working with the local Carlsbad community to resolve issues and achieve goals to the mutual benefit of both the park and the city of Carlsbad.

**Response:** It is NPS policy to work cooperatively with neighboring communities to address mutual concerns and interests. The park staff has worked with the community of Carlsbad in the past to resolve issues and achieve common goals, and they will continue to do so in the future.

**Comment:** I hope that with the new concession contract plans that they consider the goals of the Vail Agenda, the community needs and newer contract reform, and innovative techniques so that the full potential of the concessioner as a member of the team can be realized.

**Response:** The concessioner can contribute to implementation of the plan. In the future the Park Service hopes to set up a fund that would enable the concessioner to contribute to some of the capital improvements described in the plan, which would help defray federal government costs.

**Comment:** I am concerned with the proposal to open a second entrance into Ogle Cave. My concerns stem from visitor safety and unforeseen impacts to the cave. Prefer future access by recreational cavers through the natural entrance.

**Response:** No decision has been made on whether or not to open a second entrance to Ogle Cave. A need assessment would be conducted to determine if visitors desire the type of cave experience that could be offered at Ogle Cave and to look at the cost effective-

**Comment:** I am interested in seeing an interagency agreement for the joint management of the imminent Big Manhole/Lechuguilla Cave system.

**Response:** It has not been determined that the Big Manhole and Lechuguilla Caves are connected. However, the concept of proactive, cooperative management of such caves is reasonable. Park managers will consider pursuing such an interagency agreement, and will incorporate this action into the Cave Management Plan, as appropriate.

**Comment:** Pave the Guadalupe Ridge Trail from the cavern entrance area to Guadalupe Mountains National Park.

**Response:** There is no demonstrated interest or need to pave this trail. Paving the trail would increase use and could have many impacts on the adjacent wilderness area, as well as on nearby caves and cultural and paleontological resources. It would be costly to pave the trail, which could result in limited funds being diverted from other high priority tasks. This action also would be inconsistent with the

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*Comments and Responses*
CONSULTATION AND COORDINATION

The park’s Backcountry/Wilderness Management Plan.

This action could not be taken without consulting the U.S. Forest Service and the Bureau of Land Management since much of this trail is on lands they administer.

Comment: Burn the whole park every three years so that fuel does not build up so that fires become catastrophic.

Response: Prescribed burns are used in Carlsbad Caverns National Park on a periodic basis. As noted in the draft document, the park’s Fire Management Plan guides the management of fires, including prescribed fires. A Draft Fire Management Plan also has been developed for the Guadalupe Mountains region, which details a program of prescribed fires in interagency fire management zones. Finally, the draft document states that the role of fire in the Chihuahuan Desert ecosystem would be studied, and results would be incorporated into the park’s fire management program, as appropriate.

Comment: No expansion of park boundaries or buffer zones for threatened and endangered species of animals or plants, or against industry or human use for agriculture, hunting.

Response: During the general management planning process, the planning team did not identify the need to significantly expand park boundaries or provide a buffer zone for the park. As stated on page 15 of the draft document, the Park Service considered two proposals to make major changes to the park’s boundary, but after consultations with its neighboring agencies determined there was no need to do so. However, the Park Service would reexamine this possibility if future changes in land management threaten park resources or put outstanding resources adjacent to the park at risk. On a related issue, see the response to the Bureau of Land Management’s comment letter.

Written Comments and Responses

The following governmental agencies, organizations, and individuals sent written comments on the draft document, which are reprinted on the following pages.

U.S. Department of the Interior
  Bureau of Land Management 165
  Fish and Wildlife Service (see appendix J)
U.S. Environmental Protection Agency 167
New Mexico Environment Department 169
Eddy County Board of Commissioners 171
Carlsbad Chamber of Commerce 173
The Cavern Supply Company, Inc. 176
Central Arizona Grotto 178
Chihuahuan Desert Conservation Alliance 180
LEARN 181
National Parks and Conservation Association, Southwest Regional Office 185
National Speleological Society
  Conservation Chairman 196
  President 199
New Mexico Natural History Institute 201
Sandia Grotto 202
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White’s City Incorporated 207
Carol Belski 208
Lois Bergthold 210
Donald G. Davis 212
Jim Evatt 213
Pat Jablonsky and Bill Yett 215
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Terry Marshall 223
Robert Montgomery 225
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George Veni 229
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COMMENTS

RECEIVED

FEB 28 1996

United States Department of the Interior

IN REPLY REFER TO: 1793 (06010)

FEB 14 1996

Memorandum

To: Planning Team Leader, Carlsbad Caverns General Management Plan

From: District Manager, Roswell District

Subject: Comment on Draft Carlsbad Caverns General Management Plan/Environmental Impact Statement

We have reviewed the Draft General Management Plan/Environmental Impact Statement for Carlsbad Caverns National Park. We have a comment regarding boundary modifications.

Frank Deckert and I have discussed the subject of minor boundary modifications as a means of eliminating some management problems encountered by our agencies. A proposal has been made to the National Park Service's Intermountain Field Area Director for two modifications of the Park's boundary. A copy of a letter to Frank Deckert with enclosures is attached, to provide some background on this proposal.

It seems prudent to address the subject of minor boundary modifications in the plan, to lay the land use planning and environmental analysis groundwork for possible future boundary change opportunities. We understand that Congressional action is necessary for boundary modifications. However, discussion of the topic in a management plan and environmental impact statement would serve to disclose possible future plans to the public and provide National Environmental Policy Act compliance. Having the results of NEPA analysis and public comment in hand would be beneficial when boundary modification proposals are presented to Congress.

There are several locations where a minor boundary modification would eliminate existing management difficulties for both the National Park Service (NPS) and the Bureau of Land Management (BLM). An exchange of small acreages of lands between the NPS

RESPONSES

1. The National Park Service agrees that the public should be aware of and have the opportunity to comment on any future boundary modification or land exchange proposals, in accordance with the National Environmental Policy Act. However, the specific details of minor boundary adjustments have not been decided. In addition, this issue was raised after public meetings and public review of the draft document had already been held, so potentially interested persons might be unaware that the issue exists. Consequently, additional opportunities for public input would need to be provided, which would delay the record of decision and implementation of the proposed plan. Delaying the plan in order to provide additional opportunities for public comment or to assess the environmental effects of minor boundary adjustments would not be in the best interest of preserving the park's significant resources.

Alternative 2 (the proposed action) has been revised to state that minor boundary modifications or land exchanges with other federal agencies that are of mutual administrative benefit would be considered and would be evaluated in accordance with the National Environmental Policy Act.
and BLM, or some kind of administrative boundary realignment, could be used to improve the management capabilities of both agencies.

The two primary locations for boundary modifications are discussed in the enclosures; there are other opportunities as well. It seems reasonable to discuss the possibility of boundary modifications in the General Management Plan. We urge you to include the topic in the plan, so that future needs of the NPS or the BLM in this regard would not be affected by the need to first amend a management plan and conduct additional environmental analysis.

Thank you for the opportunity to review and comment on the Draft General Plan.

Sincerely,

Leslie M. Cone
District Manager

Attachments:
1-Letter to Frank Deckert
with 3 enclosures
In accordance with our responsibilities under Section 309 of the Clean Air Act, the National Environmental Policy Act (NEPA), and the Council on Environmental Quality Regulations (CEQ) for implementing NEPA, the U.S. Environmental Protection Agency (EPA) Region 6 office in Dallas, Texas, has completed its review of the U.S. Department of the Interior, National Park Service (NPS) General Management and Development Concept Plan Draft Environmental Impact Statement (DEIS) for Carlsbad Caverns National Park, Eddy County, New Mexico.

The General Management and Development Concept Plan for Carlsbad National Park is a guide to set forth the basic management philosophy and to provide for a strategy for addressing issues and for achieving management objectives for the park over the next 10 to 15 years. Under the proposed action, Alternative 2, would base resource management direction and visitor use decisions on scientific research, inventory, and monitoring. Data would be gathered about how human activities and facilities are affecting park resources and would consider measures possibly ranging from infrastructure improvements to the removal of certain facilities above Carlsbad Caverns. The DEIS states that no significant adverse impact would occur to natural resources as result of the implementation of proposed management plan. The plan would protect the park's significant resources better than the no action alternative.

EPA classifies your DEIS and proposed action as "LO," i.e., EPA has "Lack of Objections". Our classification will be published in the Federal Register according to our responsibility under Section 309 of the Clean Air Act, to inform the public of our views on proposed Federal actions.
<table>
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<tr>
<th>COMMENTS</th>
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<tr>
<td>We appreciate the opportunity to review the DEIS and request that you send our office one (1) copy of the Final EIS at the same time that it is sent to the Office of Federal Activities, EPA, 401 M. Street, SW, Washington, D.C. 20460.</td>
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<tr>
<td>Sincerely yours,</td>
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<tr>
<td>Michael P. Janney, P.E.</td>
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<td>Michael P. Janney, P.E.</td>
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<td>Regional 109 Review Coordinator</td>
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| RESPONSES |
December 20, 1995

Planning Team Leader
Carlsbad Caverns General Management Plan
National Park Service/Denver Service Center
P.O. Box 25287
Denver, CO 80225-0287

Dear Planning Team Leader:

The following transmits New Mexico Environment Department (NMED) staff comments regarding the above-referenced Draft General Management Plan/Environmental Impact Statement (DEIS).

SURFACE WATER QUALITY

We should preface our comments with the statement that any changes incorporated into the proposal that could have a surface water quality impact, must comply with the State of New Mexico Water Quality Standards, Water Quality Act, Water Quality Control Commission (WQCC) regulations and related New Mexico statutes.

The National Park Service in their Regulatory Compliance Action Section (pages 161 and 162) recognize their responsibilities under the Clean Water Act, section 404, permit, as the draft document indicated on page 161, the proposed action would not involve any action that would require such a permit.

 Owners/operators of construction projects of five acres or more are required to apply for, at a minimum, permit coverage under the NPDES baseline general storm water permit for construction activities. The permit coverage may be obtained by filing a Notice of Intent (NOI) no later than forty-eight hours prior to commencing construction activities. This permit requires, in particular, that a site-specific, storm water pollution prevention plan (SWPPP) be prepared before submission of the NOI and that appropriate pollution prevention measures be installed at the site in a timely manner.

Best Management Practices (BMPs) are measures or practices used to reduce the amount of pollution entering surface/ground waters, air
COMMENTS

Planning Team Leader
December 20, 1995
Page 2

and land; they must be developed and implemented for construction sites equal to or greater than five acres in size. Information on the development of BMPs may be available from the New Mexico State University/Cooperative Extension Service, the U.S. Department of Agriculture/Soil Conservation Service and the USEPA document entitled Storm Water Management For Construction Activities. Information regarding this document and copies of the baseline general permit (which includes the NOI form) may be obtained by calling USEPA at (202) 260-7786.

We should also mention that anyone intending to do dredge and fill work in a water of the United States (e.g., river, creek, arroyo, gully etc.) must obtain a Section 404 (of the Clean Water Act) permit from the U.S. Corps of Engineers. Almost all permits for work in a perennial stream have the condition of New Mexico State water quality certification (Section 401).

GROUND WATER

The NMED's Ground Water Pollution Prevention Section (GWPPS) has no record of a discharge permit for the existing Carlsbad Caverns sewage lagoons which are shown on a number of maps in the DEIS. This is most likely due to the lagoons being in existence since prior to the 1977 effective date of the WQCC regulations. If the National Park Service plans to in any way modify the existing lagoons, or if new wastewater treatment and/or disposal facilities are to be built, a discharge permit may be required. The National Park Service may contact the GWPPS at 827-2900 to obtain more information about discharge permit requirements.

We appreciate the opportunity to review and comment on this document.

Sincerely,

[Signature]

Dari Cibas, Ph.D.
Environmental Impact Review Coordinator

File No. 940

RESPONSES

2. Under the proposed action it is not yet known what modifications of the existing sewage lagoons, if any, would be needed. If facilities were partially or fully moved off the escarpment, then modifications would likely have to be made to the sewage treatment system. The regulatory compliance section in the final document has been revised to indicate that if modifications were made to the wastewater treatment system, a state groundwater discharge permit would be obtained from the state.
COMMENTS

March 5, 1996
Planner, Team Leader
Carlsbad Caverns General Management Plan
National Park Service, Denver Service Center
P. O. Box 25287
Denver, CO 80225-0287

To Whom It May Concern:

The Eddy County Board of Commissioners would like to offer comments and recommendations on the Draft General Management Plan/EIS for Carlsbad Caverns National Park. After review of the three alternatives, it is the view of the Board to support Alternative One for the following reasons.

Alternative One continues the current management direction and also takes into consideration improvements to improve efficiency. The NPS has managed the Caverns for a quality experience and has been able to do this without increased personnel. Alternatives Two and Three require more personnel, salary and benefits. The current Federal administration has said it supports downsizing of the federal government and feel the current number of employees is satisfactory for efficient management of the Caverns.

Alternatives Two and Three also require a significant amount of money to complete construction improvements and additions. With the shortfall and current budget deficit, the country can no longer arbitrarily spend money as in the past. The Federal Government has to become responsible to its constituents.

The Eddy County Board of Commissioners also support leaving the lunchroom in the Caverns. There has been no scientific information to support claims from the NPS that the lunchroom is detrimental to the integrity of the Park. The lunchroom has been an integral part of the Cave experience for years and is a vital asset to our County's economy.

Thank you for the opportunity to address the Draft Management Plan and offer our comments.

RESPONSES

1. As noted on page 14 of the draft document, the Park Service decided to remove underground concessions because the purposes for which the lunchroom facility was established are no longer valid. Early visitors to the cavern spent 8 to 10 hours hiking into and out of the cavern; however, currently visits last between 1 and 3 hours, and visitors are within a few minutes of the surface by elevator. The Park Service believes that retaining the lunchroom facilities in the midst of the park's prime resource is not in keeping with the NPS philosophy of protecting and highlighting the cave's special resources and character. In addition, the 1993 environmental assessment identified negative impacts associated with the lunchroom. The Park Service believes that impacts of visitors in the cave can be more effectively reduced by removing the concession facilities, increasing efforts to educate visitors regarding impacts, and increasing NPS roving patrols, than by restricting eating to one area of the cave. Removing the lunchroom facility would also improve the visual character of the heart of the cave.
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March 20, 1996

Planning Team Leader
Carlsbad Caverns General Management Plan
National Park Service
Denver Service Center
PO Box 25289
Denver, CO 80225-0287

Dear Sir or Madam:

Thank you for the opportunity to lend our support to the General Management Plan/Environmental Impact Statement. We support Alternative 2 and agree that it represents the best of the three proposed alternatives. I hope we can assist your management team in any way you deem appropriate in bringing about the goals in Alternative 2.

We have only one objection to the content of Alternative 2. We hope you will consider fully our input in this one area.

On page 14 under 'ISSUES NOT ADDRESSED IN THIS PLAN, Underground Concessions', the statement "The underground concession operation within the cave has been the subject of controversy in recent years." is accurate. The controversy, however, was created by the National Park Service in taking the position of planning to remove the Underground Lunchroom facilities from the cave. No controversy existed until this decision was announced by the National Park Service.

In 1988, a study was conducted by the National Park Service, via a contract issued to Texas A&M University, to determine visitor attitudes toward the Underground Lunchroom facilities. By a large majority, visitors responding to the survey reported a strong desire for the Underground Lunchroom facilities to remain open. During this same time frame, an environmental assessment was conducted on the facility with the resulting Finding of No Significant Impact (FONSI).

Despite the visitor survey and the Environmental Assessment, an Associate Regional Director, Southwest Region, came to Carlsbad from his office in Santa Fe to announce the National Park Service decision to close the Underground Lunchroom.

1. No new information has come to light that would cause a reexamination of the decision made in 1993 to close the underground lunchroom. As noted on page 14 of the draft document, the Park Service decided to remove underground concessions because the purposes for which the lunchroom facility was established are no longer valid. The Park Service believes that the lunchroom facilities in the midst of the park's prime resource are not in keeping with the NPS philosophy of protecting and highlighting the cave's special resources and character; currently the underground lunchroom is the first and last thing many visitors see in Carlsbad Cavern. In addition, the 1993 environmental assessment identified negative impacts associated with the lunchroom. Park rangers have found in the cave candy wrappers, water bottles, and flashlight covers, among other trash, that have come from the lunchroom. The Park Service believes that impacts of visitors in the cave can be more effectively reduced by removing the concession facilities, increasing efforts to educate visitors regarding impacts, and increasing NPS roving patrols, than by restricting eating to one area of the cave. Removing the lunchroom facility would also improve the visual character of the heart of the cave.
During the discussion that followed this announcement, the Associate Director was asked how he could justify such a decision given the results of the visitor survey and the strong indication that the visitors want the facility to remain. The Associate Director's response was, "This is not a democratic process" and further implied that the preference of the park users was of secondary importance. This same statement was repeated several times that same day by the Associate Director as the delegation met with other organizations throughout the day including the Carlsbad Chamber of Commerce, Department of Development, Eddy County Commissioners, the Mayor and others.

During the weeks that followed, there was indeed "controversy" as all the above referenced organizations took a position to strongly oppose the proposed action. This resulted in an examination of the issue by members of the New Mexico congressional delegation. The examination revealed that the reasons cited for the decision to close the facility lacked substance and further stated that the peoples' wishes should be recognized.

The congressional delegation also took steps to add language to the Interior Budget legislation that effectively made it unlawful to use any funds to plan or implement removal of the Underground Facility.

Despite its undertaking and ultimate repudiation of the MPS position, Alternative No. 2 in the General Management Plan still sites the "Park Service's long-range goal is to remove all underground concession facilities."

Among the reasons included in the GMP for removal of the Facility is the statement, "Negative impacts associated with the lunchroom include food and trash found in the cave outside the underground lunchroom area (including in cave pools)" -- The uninformed reader would surely form the opinion that the lunchroom is responsible for the referenced trash when reading this statement. Volunteer workers who clean the cave as a labor of love, confirm that the tons of debris they have removed from throughout the cave include relics, some from the distant past, cans and bottles, and discarded material from discontinued National Park Service systems including large quantities of wire and burned out light bulbs. These volunteers confirm that none of the trash they have removed can be credited to the lunchroom operation. However, there is strong indication that if the lunchroom was removed, as proposed, there would be a dramatic increase in food and other articles brought into the cave and remnants thereof discarded along the trails throughout the Caverns. Does it not make good management sense to restrict eating activity in the cave to one controlled area where food remnants and packaging material is disposed of in an efficient, orderly manner?
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| Finally, allow me to urge the NPS to open the recently discovered Ogle Cave. I am told that Ogle Cave rivals all other caves in the world in beauty and splendor. It would be a shame to keep this spectacular sight from the world. Thank you again. I remain....

Most Cordially Yours,

Ronald J. Balmer
Executive Director |
COMMENTS

On page 14 under ISSUES NOT ADDRESSED IN THIS PLAN, Underground Concessions, the statement "The underground concession operation within the cave has been the subject of controversy in recent years." is indeed correct. The controversy, however, is created by the National Park Service taking the arbitrary position of planning to remove the Underground Lunchroom facilities from the cave. No controversy existed until this decision was announced by the National Park Service.

In retrospect, in 1988, a study was conducted by the National Park Service, via a contract issued to Texas A&M University, to determine visitor attitudes toward the Underground Lunchroom facilities. By a substantial majority, visitors responding to the survey reported a strong desire for the Underground Lunchroom facilities to remain as is. During this same time frame, an environmental assessment was conducted on the facility with the resulting Finding of No Significant Impact (FONSI).

Subsequent to the visitor survey and the Environmental Assessment, an Associate Regional Director, Southwest Region, came to Carlsbad from his office in Santa Fe to announce the National Park Service decision to close the Underground Lunchroom.

On the day of this announcement, I asked how the National Park Service could justify such a decision considering the results of the visitor survey and the strong indication that the visitors want the facility to remain. The Associate Director's response was, "This is not a democratic process" and further implied that the preference of the park users was of secondary importance. This same statement was repeated several times that same day by the

RESPONSES

1. No new information has come to light that would cause a reexamination of the decision made in 1993. As noted on page 14 of the draft document, the Park Service decided to remove underground concessions because the purposes for which the lunchroom facility was established are no longer valid. The Park Service believes that the lunchroom facilities in the midst of the park's prime resource are not in keeping with the NPS philosophy of protecting and highlighting the cave's special resources and character; currently the underground lunchroom is the first and last thing many visitors see in Carlsbad Cavern. In addition, the 1993 environmental assessment identified negative impacts associated with the lunchroom. Park rangers have found in the cave candy wrappers, water bottles, and flashlight covers, among other trash, that have come from the lunchroom. The Park Service believes that impacts of visitors in the cave can be more effectively reduced by removing the concession facilities, increasing efforts to educate visitors regarding impacts, and increasing NPS roving patrols, than by restricting eating to one area of the cave. Removing the lunchroom facility would also improve the visual character of the heart of the cave.
COMMENTS

Planning Team Leader
February 20, 1996
Page 2

Associate Director as the delegation met with other organizations throughout the day including the Carlsbad Chamber of Commerce, Department of Development, Eddy County Commissioners, and Mayor and others.

During the weeks that followed, there was indeed "controversy" as all the above referenced organizations took the position of strongly opposing the proposed action of the Underground Luncheon closure. This resulted in an examination of the issue by members of the New Mexico congressional delegation. The examination revealed that the reasons cited for the decision to close the facility lacked substance and further stated that the peoples' wishes should be recognized.

The congressional delegation also took steps to add language to the Interior Budget legislation that effectively made it unlawful to use any funds to plan or implement removal of the Underground Facility.

And still, as stated in Alternative No. 2 in the General Management Plan, the "Park Service's long-range goal is to remove all underground concession facilities" --

Among the reasons included in the GMP for removal of the facility is the statement, "Negative impacts associated with the Luncheon include food and trash found in the cave outside the underground luncheon area (including in cave pools)" -- The uninformed reader would surely form the opinion that the luncheon is responsible for the referenced trash when reading this misleading statement. Volunteer workers who clean the cave as a labor of love, confirm that the tons of debris they have removed from throughout the cave include relics, some from distant past, cans and bottles, and discarded material from discontinued National Park Service systems including large quantities of wire and burned-out light bulbs. These volunteers confirm that none of the trash they have removed can be credited to the luncheon operation. However, there is strong indication that if the luncheon was removed, as proposed, there would be a dramatic increase in food and other articles brought into the cave and remnants therefrom discarded along the trails throughout the Caverns. Does it not make good management sense to restrict eating activity in the cave to one controlled area where food remnants and packaging material is disposed of in an efficient, orderly manner?

The other statement listed as a negative in connection with the Underground Luncheon on page 14, "possibly changes in the numbers and types of insects found in the cavern." is also misleading to the reader. The statement itself indicates that the idea about insects is some individual's guess that there may be some substance to the speculation.

I agree with Alternative No. 2 as a management concept except for the concern listed above. The Underground Luncheon facility should be retained, as is.

Thank you for the opportunity to comment on these important issues.

George W. Crump
President
GWC:ces
Bill Lowell-Britt  
March 14, 1996

Planning Team Leader  
Carlsbad Caverns General Management Plan  
National Park Service/Denver Service Center  
PO Box 25287  
Denver, CO 80225-0287

Planning Team Leader:

Members of the Central Arizona Grotto (affiliated with the National Speleological Society) in Phoenix have regularly visited caves in Carlsbad Caverns National Park. Members of the club have been in Lechuguilla, Ogle, other backcountry caves and in areas of Carlsbad closed to tourists.

I recently reviewed the Draft General Management Plan/Environmental Impact Statement and have a few comments to make. As a general statement, cavers like to see access maintained for recreational purposes in caves in addition to the exploration, survey and scientific uses of caves.

* There is no problem in an inventory and assessment of the backcountry caves or with gating caves to protect those resources. Cavers will cooperate with the Park Service as long as entry is granted with an equitable permit system (similar to what is now in place).

1. Spider Cave is mentioned on page 108 of the draft document. Management of Spider Cave is addressed in the park's Cave Management Plan. Public access is permitted only on ranger-guided tours. No change is proposed in the status or management of Spider Cave.

2. There are over 80 caves known in the park, but currently most visitors have opportunities to visit only Carlsbad Cavern, Slaughter Canyon Cave, and Spider Cave. Ogle Cave could provide visitors with another opportunity to enjoy the park's special resources. It might not be feasible to improve access to the cave, and increased visitation could pose unacceptable risks. Alternative 2 has been revised to call first for a need assessment to determine if visitors desire the type of cave experience that could be offered at Ogle Cave and to look at the cost effectiveness of providing improved visitor access. If necessary, a subsequent study would assess the feasibility and impacts of developing visitor access to Ogle Cave. Note that these studies are phase III actions (to be undertaken in 10 to 15 years); they would not begin until higher priority actions had been taken to protect park resources.
Backcountry cavers only represent a small fraction (incredibly small according to your
visitation numbers) of the total users of the Park. However, that part of New Mexico
contains some of the most fantastic caves in the world. I appreciate the chance to
comment on the draft General Management Plan.

Sincerely,

Bill Lowell-Britt
Conservation Chair, Central Arizona Grotto
Planning Team Leader
Carlsbad Caverns General Management Plan
National Park Service/Denver Service Center
P. O. Box 25287
Denver, Colorado 80225-0287

Dear Planning Team Leader:

I am writing in regards to the Draft General Management Plan Environmental Impact Statement for Carlsbad Caverns National Park on behalf of the Chihuahuan Desert Conversation Alliance. Our group is centered in southeastern New Mexico and we deal with public lands issues, endangered/threatened species and similar issues of environmental concern. We understand that the January deadline was extended until the end of February due to the government shutdowns during the winter.

We have read over the document and are in general agreement with most of Alternative C. We are concerned that the park protect the natural elements in the park first and we feel that Alternative C does the best job of doing that. We are also concerned that too much attention is paid to cultural/historical concerns in the park and not enough toward natural aspects. This concern deals mainly with NPS plans for Rattlesnake Springs.

Many of our members use Rattlesnake Springs to watch birds or hike. We would not want to see the natural elements there degraded in order to develop more historic interpretation. People visit Rattlesnake Springs for the natural, not the historical aspects. We are pleased though with the growing concern in the park with reestablishing extirpated species such as Montezuma Quail and Mountain Sheep and in the removal of exotics. We would like to see an adequate inventory conducted of the current biodiversity in the park.

Please keep us informed as to your decisions regarding this Management Plan and place us on your mailing list for similar requests for public input. Thank you very much for the opportunity to comment.

Sincerely,

Steve West, President
Chihuahuan Desert Conservation Alliance

RESPONSES

1. One of the purposes of Carlsbad Caverns National Park is to preserve and protect both natural and cultural resources associated with the Chihuahuan Desert and Capitan Reef. Alternative 2 calls only for expanding existing wayside exhibits near the Rattlesnake Springs picnic area to interpret the natural and historical resources of the area (see page 52 of the draft). This action would not degrade the area's natural elements. Appendix C of the draft document states that the area would be managed as a cultural landscape. This management strategy would allow the Park Service to maintain and preserve historic features while enhancing biotic resources. However, no action would be taken until studies on the area's resources have been completed.

With regard to inventorying the park's biodiversity, the plan references the Resources Management Plan, which calls for surveys of the park's vegetation and wildlife (see page 17 of the draft document).
Dear Superintendent Deckert:

This letter is in response to the Draft General Management Plan / Environmental Impact Statement (GMP) for Carlsbad Caverns National Park. I regret that this letter comes after the closing date for statements In regards to it, but LEARN's Coordinating Committee did not have the chance to discuss it until the January 24th conference call. I hope that our late input will still offer some substantial suggestions.

As you know, LEARN has been Involved In the exploration and surveying of Lechuguilla Cave for several years. In the time since the cave re-opened in 1993 for that purpose, approximately thirty miles of passage have been added to the known length of Lechuguilla and a great deal of scientific study has been undertaken as well. Unfortunately, a certain amount of degradation has also taken place in the cave, hand In hand with this acquired knowledge. With the resultant closing of the cave to exploration and surveying during 1996, we all have a chance to re-assess what has happened and how we can help to prevent this In the future. We addressed many of these issues In our letter of 10/25/95.

As the GMP proposes specific actions in regards to Lechuguilla In its three alternative plans, we would like offer the following commentary:

**Alternative 3** suggests that all teams going into Lechuguilla be required to have a Park Service personnel member accompany them, resulting In "reduce[d] general cave damage, speleothem discoloration, and formation breakage..." While the intent of the proposal is sound, we disagree with the suggestion that it would reduce cave degradation. In fact, we respectfully submit that It would have just the opposite effect.
To a large degree the degradation of the cave is taking place due to the sheer number of people going into it, not just by people being careless in their caving etiquette. With the addition of that many more Park Service personnel to exploration team members, it would mean added impact, not a lesser amount. It also implies that everyone that goes into Lechuguilla cannot be trusted to practice proper caving skills and conservation ethics. If such is the case from the Park's perspective, then no one who is not a Park employee should be allowed in the cave, period. It is fairly clear that such is realistically not the Park's view.

LEARN has a very strict set of requirements and reference checks and balances that help assure that anyone coming on an expedition will live up to the highest standards of caving ethics. Any Individuals who do not live up to those requirements are not allowed in the cave.

Alternative 2 suggests including a Park personnel member on most parties entering Lechuguilla. For the sake of clarity, I will take this to mean that perhaps one or two Park Service members would join expeditions going into the cave, not necessarily joining every single team that goes in. (On average, the 30 expedition members of a LEARN trip break up into 8 - 10 teams that go into different parts of the cave.)

LEARN has always welcomed the inclusion of Park Service personnel on any of their expeditions. It has usually been the lack of funding and free time for Park employees that has prevented them from joining us more often. If such funds were available for that purpose, so much the better. Such an inclusion would greatly improve communications and rapport between the Park and LEARN team members, helping to avoid misunderstandings in the future. As a result, mapping efficiencies could be greatly improved as Park employees are frequently the ones who must collate all the data brought to them by exploration parties.

Another potential benefit to added Park team members would be their accompaniment of Lechuguilla "novices". LEARN has a mandate to include a certain number of first-timers on its expeditions. We have also been asked by the Park to include a few foreign cavers which we have gladly taken on. While most of the time these newcomers have proven to be perfectly capable, their presence does detract from the efficiency of experienced teams. Newcomers must deal with the immense size of the cave, the heat, the potential dehydration plus just a chance to see what
this famous cave is all about. While they may have the best of intentions, the new-ness of the cave may cause them to make mistakes that are otherwise avoided by more experienced personnel. Having a Park member along to provide guidance might prevent many of these problems from becoming bigger ones. As such, we would welcome Park Service cavers, as suggested in Alternative 2, as an added benefit to our own exploration expeditions.

We support the concept of an improved airlock gate on the entrance of Lechuguilla.

While LEARN's realm of work within the Park is largely involved with Lechuguilla only, we would like to add our comments concerning the development of Ogle Cave. Both Alternatives 2 and 3 suggest the possible development of Ogle for visitor use. We respectfully suggest that Ogle remain as it is.

One alternative cave, Slaughter Canyon/New Cave, with much the same history as Ogle, is already developed and seen by many Park visitors. It is much closer to the canyon mouth and affords easier access to people. Ogle is more than twice the distance away over very rough terrain, followed by a very steep climb to the entrance. It seems highly improbable that the number of visitors to the cave, if developed, would compensate for the ecological degradation brought upon it. Increased visitation to the cave, even under Park Service guided trips, would do more damage to it than simply leaving it as it is. As the GMP points out, there would be the possibility of increased vandalism and formation removal from the cave. The addition of an artificial entrance (completion of the man-made tunnel for easier access) could bring serious environmental consequences on the cave, much as has been seen in Carlsbad and Lechuguilla. For those people looking for more cave visitation opportunities at the Park, we would suggest that Spider Cave might be a more appropriate one to consider as it differs significantly from the experience of Slaughter Canyon and Ogle Caves. Those with interests beyond that should be directed towards organized caving groups within their own territory, rather than foist them upon the Park's fragile resources.

We hope that you will find these suggestions of value when the Park reaches its final Decision of Record on the management of Carlsbad Caverns.

2. There are over 80 caves known in the park, but currently most visitors have opportunities to visit only Carlsbad Cavern, Slaughter Canyon Cave, and Spider Cave. Ogle Cave could provide visitors with another opportunity to enjoy the park's special resources. It might not be feasible to improve access to the cave, and increased visitation could pose unacceptable risks. Alternative 2 has been revised to call first for a need assessment to determine if visitors desire the type of cave experience that could be offered at Ogle Cave and to look at the cost effectiveness of providing improved visitor access. If necessary, a subsequent study would assess the feasibility and impacts of developing visitor access to Ogle Cave. Note that alternative 2 categorizes these studies as phase III actions; they would not begin until higher priority actions had been taken to protect Carlsbad Cavern. Visitor access to the cave would be improved only if it was determined to be feasible and no significant impacts to the cave would occur.
National Park. As always, if LEARN can be of any assistance to you, please do not hesitate to call upon us.

Sincerely,

[Signature]

Peter M. Jones
LEARN Liaison Officer
Dear Ms. Stuebe:

The National Parks and Conservation Association (NPCA) appreciates this opportunity to comment on the draft General Management Plan/Environmental Impact Statement for Carlsbad Caverns National Park. NPCA is a 450,000-member citizens organization, founded in 1919, dedicated to the protection and enhancement of the National Park System.

NPCA has participated in scoping for the GMP and in other GMP-related discussions. Our comments on the draft GMP, and our basic approach to the future management of the park, remain largely consistent with previous input to NPS. NPCA generally supports Alternative 2, the preferred alternative, but recommends some modifications that are extremely important in our view.

General Comments/Planning Process

NPCA is pleased to see this draft GMP/EIS out for public review. The design and thickness of the document, however, makes it physically difficult to read; text and figures closest to the binding are often obscured. We note that the process has taken over three years to this point and the project is currently under the direction of a third planning team captain. Compared to a few other recent planning efforts in the Southwest, this elapsed time is perhaps not too excessive, but it is still somewhat disconcerting. On the other hand, over the three years, alternatives have been refined. Some objectionable proposals have been eliminated altogether. In this sense, the elapsed time was not entirely wasted, the planning process has worked as it should (i.e. proceeded in the right direction), and has resulted in a stronger overall draft GMP. Judging from some statements in the draft, on some topics NPS might have done a better job of tapping local expertise about Carlsbad and its resources.
NPCA comments on draft GMP/EIS
Carlsbad Caverns National Park
Page 2

NPCA also recognizes that timing is a bit off for this GMP, which creates some difficulties and uncertainties. Significant information gaps have persisted throughout the GMP revision process (particularly critical information related to infiltration studies and contamination threats to park caves). The GMP would be a much more informed and useful document with these studies completed, and fewer decisions deferred. Nonetheless, the GMP has helped catalyze the initiation of the infiltration studies and has helped identify other serious park needs at an important time. As such, NPCA is pleased that NPS is moving forward on key issues and articulating a park management vision based on the best available information. This is a worthwhile endeavor that will be refined and improved upon during implementation, as is the case with most GMPs.

NPCA does, however, encourage NPS to consider this example and to seize upon any relevant lessons as it evaluates and attempts to improve the planning process throughout the National Park System. NPS and NPCA generally share the goals of shortening NPS planning time frames, strengthening the resource protection and stewardship outcomes of planning efforts, and improving the usefulness and practicability of plans without compromising the quality of the product. We would like to see NPS routinely assess itself after completion of a GMP or other major planning exercise. NPCA would be interested in then exploring these conclusions with the Park Service.

General Comments/Importance and Overall Quality of the Plan

Carlsbad Caverns National Park has world-class resources that deserve world-class management. This draft GMP/EIS represents a critical watershed for Carlsbad Caverns National Park that should take the NPS further in the direction of such management.

NPS recognized when it began this planning process that the 20-year old Master Plan for the park no longer reflected current NPS policies or addressed current park management issues. Numerous resource protection and visitor management concerns, including cave contamination risks, adjacent oil/gas development, resource deterioration and visitor impacts in Carlsbad Caverns, the future of Lechuguilla Cave and other backcountry caves, air and water quality, water supply, paleontological and archaeological resource protection, museum collections, wildlife protection, and staffing and funding shortfalls coupled with increasing visitation must be addressed right away. The NPS has a sacred responsibility to meet the expectations of the American public for a standard of excellence for park stewardship and to comply with the NPS resource protection mission mandated in federal law.

Though the Master Plan is woefully dated, NPS has completed many important documents and plans in the intervening time period that have shaped management direction for the park. These include a Statement for Management, Cave Management Plan, Backcountry/Wilderness Management Plan, Resources Management Plan, etc. The draft GMP is consistent with many of these more recent documents and sets a clear management philosophy and park-specific guidance for resource management, interpretation, visitor services, and other NPS functions. NPCA is
pleased that the draft GMP articulates a long-term vision for the park, and seriously reassesses the past, present, and potential future impacts of development and visitation on primary park resources. In the preferred alternative’s call for “de-development” of the sensitive areas above Carlsbad Caverns, the NPS has shown the courage to recognize past mistakes. These are mistakes that were both intentional and unintentional and for which blame must be shared between the agency and the public. The NPS also has shown the courage to put forth bold measures that must be implemented in order to meet its responsibility to protect the parks and manage them with future generations in mind as well as the present generation. There is also, at least on paper, a strong commitment to manage Carlsbad based on science, inventory, and monitoring. The draft GMP is therefore another in a growing series of documents throughout the National Park System in which the National Park Service seeks to re-engineer itself, its management approaches, and the human influence on the parks.

NPCA strongly supports and commends this type of visionary thinking for Carlsbad and all parks. This draft GMP is generally very good, but nonetheless still has some room for improvement. It is increasingly important that NPS’s management approach be grounded in reality and a more important consideration may be in rethinking the feasibility of implementing the GMP proposals, and what happens if they are not accomplished. We must also ensure that during GMP implementation, funds and attention are really put where the greatest needs are, particularly in terms of the resource protection “bang-for-the-buck.” In that sense, NPCA believes that it is important to clarify the priority and emphasis that NPS puts on various aspects of the GMP.

GMP Alternatives and Environmental Consequences

Despite the elapsed time during this project, NPCA is pleased to see that many important aspects of the planning process have worked. Several poor ideas under consideration in earlier stages of the exercise have been eliminated from the draft GMP. Alternatives have for the most part been refined and improved. For example, previous alternatives that would have attempted to “accommodate all visitors” who come to the park have been dropped. Plans for inappropriate development, such as a campground at Slaughter Canyon, have been eliminated.

Since NPCA supports Alternative 2, the following comments relate to Alternative 2, except as otherwise noted. NPCA also supports proposed actions common to all alternatives.

Natural and Cultural Resources Management

NPCA enthusiastically supports the many of the proposed concepts for improving management of surface and subsurface resources. The goal of the NPS should be to permit biological, geological, and other natural processes to continue with a minimum of human disturbance or change. Expanded research and monitoring for all resources is an extremely important priority.

In terms of Carlsbad Caverns, NPCA strongly supports efforts to improve protection for the park’s primary resource by means of increased staff, emphasizing resource protection-oriented
NPCA comments on draft GMP/EIS
Carlsbad Caverns National Park

Page 4

interpretation, new protective techniques (barriers, improved lighting, trail re-routing and improved paving/maintenance, and new technology -- such as lint control). We support increased use of guided tours, as increased staffing allows, but do not favor an exclusive guided tour strategy at this time. Off-trail tours within Carlsbad Caverns and other caves should continue to be carefully limited, and by reservation only. Protection of the primary cave resource is woefully inadequate currently and this must be improved before NPS tackles other responsibilities. Additional NPS presence in the cave -- along with actual law enforcement -- is extremely important.

While these mitigation strategies are critical for minimizing continuing resource damage (loss and discoloration of speleothems, impacts to cave pools and species, etc.), the draft fails to acknowledge honestly that these measures are, relatively speaking, fiddling around the edges. The major resource damage to Carlsbad Caverns has occurred as the result of opening the cave to over 600,000 people per year (e.g. actions in the past that altered cave humidity).

NPCA supports installation of an airlock at Lechuguilla Cave and the continuation of the approach outlined in park planning documents on this unique and fragile resource. Adequate resources must be allocated for inventory, monitoring and management of other backcountry caves, including the installation of gates where necessary.

NPCA strongly opposes the GMP’s proposal to conduct a feasibility study of developing visitor access to Ogle Cave. We oppose this proposal for a five main reasons:

1. Ogle Cave has spectacular and fragile resources, many of which are different than those found in other park caves. The cave is difficult to enter and its features are easily damaged. Increasing public use of this cave can only lead in one direction -- increased resource deterioration. NPCA strongly opposes the draft GMP’s characterization that environmental consequences of opening Ogle Cave would be “minor” (p. 150). The discussion of these effects in the draft GMP is so completely inadequate that it is totally inappropriate at this point for the NPS to be making even a preliminary determination that a feasibility study is a good idea, even as a Phase III project.

2. Ogle Cave already has public access. Access to the park’s backcountry caves is guided by the Cave Management Plan and careful screening of visitor use occurs through the park’s Cave Management Office, a system that seems to be working well.

3. The NPS already offers a full spectrum of cave experiences in Carlsbad Caverns National Park. These range from the intensive, more crowded experience in Carlsbad Cavern, to primitive cave tours with NPS staff in backcountry caves, to the cutting edge cave wilderness experience that that posed by Lechuguilla Cave. Guided tours with NPS staff similar to what would be proposed at Ogle Cave are already offered at Slaughter and Spider caves. More primitive cave tours are also now being led into Left Hand Canyon and the Hall of the White

The Ogle Cave option is a relatively low priority for the park, and it is included in it in the third (last) phase of implementation. You are correct in stating that many pressing resource management needs deserve more immediate attention.
NPCA comments on draft GMP/EIS
Carlsbad Caverns National Park
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Giants in Carlsbad Caverns and there is even less justification to increase use of Ogle Cave in order to provide a new or "unique" experience.

- Opening Ogle Cave is an extremely low priority given the other incredible resource management, interpretation, and re-development needs at the park; any focus on Ogle Cave may divert limited staff and funding from much more important needs at the park. For example, the GMP repeatedly points out the immense shortfalls in existing NPS cave protection efforts for Carlsbad Caverns and the park's many other caves. With only 10 of the park's 82 caves open to visitor use, the NPS admits that it's inventory, monitoring, research and protection efforts are already seriously deficient. NPS says that the primary cave resource, Carlsbad Caverns, needs a huge array of management improvements in order to stop existing resource deterioration, and avert more major problems in the future. The GMP states: "The NPS does not know how often the caves are being visited, though there is evidence of vandalism and theft of cave resources. Cave resources in the backcountry are not being monitored." (p. 10) Cave protection efforts need so much enhancement that it is wrong for NPS to even consider promoting projects that would increase resource damage and add to the resource management burden. Before proposing any action whatsoever to increase access to Ogle Cave, perhaps NPS should first accomplish all of the other tasks related to cave resource protection outlined in the GMP that it believes are so important.

- The draft GMP estimates that the feasibility study alone may cost $350,000 and that access related construction might cost $775,000. Expend $1 million for this project, which would also bring long-term staffing and maintenance burdens, would be absurd when so many other critical projects are unfunded.

NPCA strongly supports most other proposals in this section. NPS needs a great deal of better information on all natural resources, as well as archaeological, paleontological, and historic resources and NPCA supports the traditional gamut of NPS operations to protect these resources (with the exception of those related to pre-development work on Ogle Cave, and some aspects of Rattlesnake Springs - see below). We strongly support efforts to integrate land management practices and provide better ecosystem production by working cooperatively with other agencies, including the Forest Service, Bureau of Land Management, and New Mexico state agencies.

Wildlife programs in general should be improved. NPS must maintain and improve a special emphasis on protection of threatened and endangered species. NPCA also supports efforts to obtain better information on reptiles and amphibians, restore the native desert bighorn sheep to the park, and continue to advance our knowledge about Carlsbad Caverns' bats and swallows.

Interest in this subject of bat/swallow interactions is a little puzzling since research on the park's cave swallows has been ongoing for ten years with very little direct NPS support. There does not appear to be major competition between the species, and bats and swallows are both more natural elements in the cave than its 600,000+ annual human visitors. An overemphasis on this question, and on studying questions like the effect of vehicular activity on the bat flight, does not seem

3. References to competition between cave swallows and bats have been deleted.
NPCA comments on draft GMP/EIS
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Warranted when NPS faces so many other resource challenges. This may be an example of how NPS, in its zeal to be inclusive in GMPS, could do a better job of setting priorities.

NPS does need to put much more emphasis, however, on understanding and trying to protect species that do migrate, such as bats and swallows, when they are out of the park. These species are some of the touchstone resources of the park, yet the draft GMP has one sentence (p. 41) on this topic: "The Park Service would support national and international outreach educational programs, such as Bat Conservation International." Here is one area where NPCA would challenge NPS to be more visionary in the GMP in terms of working internationally, and devoting specific dollars to protecting key park resources, rather than relying on platitudes about environmental education. Perhaps there should be an "extra-park" component to the GMP (or even the construction project list) that focuses on these issues, somewhat similar to the way that the NPS is exploring regional information, education and access — but going even further.

NPCA of course support emphasis on water conservation and other sustainable development practices at the park. Indeed, the park staff should be commended for the initiatives that have already been taken in this area to incorporate sustainability concepts into as many park operations as possible, while promoting environmental awareness in staff, concessions employees, and visitors.

Visitor Use

A major flaw of the draft GMP is that it was drafted without sufficient knowledge about what levels of use are even appropriate for Carlsbad Caverns National Park. NPCA is pleased that the draft GMP includes a discussion of carrying capacity and the Visitor Experience/Resource Protection (VERP) process. The draft should state that establishing carrying capacities for every park through the GMP is mandated by P.L. 95-625. NPCA helped lead the way in designing such methodologies through our Visitor Impact Management program.

NPCA agrees that it is unacceptable for carrying capacity to be defined at national parks in terms of physical or facility limits. (p. 49) We strongly believe that the emphasis must be changed from managing the park for maximum visitor access to an approach that maintains desired resource and social conditions that are consistent with law, park purposes and management objectives.

Preserving the quality of the visitor experience is a serious and increasing challenge at many parks, particularly at Carlsbad Caverns. Comments on this issue have been steady throughout the GMP process, beginning with the first planning newsletter in 1993. VERP is essential because it will help decide what visitor levels and impacts are acceptable, and set up a scientific, defensible methodology and strategy for measuring, monitoring, and responding to impacts so that they do not exceed pre-set thresholds. Most importantly, this process should help define and set the parameters of planning work.

Unfortunately, NPCA cannot be satisfied with the statement that NPS "would conduct a carrying capacity study using a VERP process as soon as possible." (p. 49) Tackling this issue is key to virtually all decisions in the park, particularly those connected to cave management and the

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4. It is important for the National Park Service to work cooperatively with others to achieve common goals and address mutual concerns. The Park Service is committed to working "in partnership with other federal agencies, with state, local, and tribal governments, and with nonprofit organizations, both in identifying resources, and in creating strategies to protect, manage, and interpret those resources," as stated in National Parks for the 21st Century: The Vail Agenda. This is a service wide policy.

5. A reference to PL 95-625 has been added. The Park Service agrees that the VERP process should be initiated as soon as possible, and it has been moved to phase 1.
**COMMENTS**

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potentially major changes to the cave entrance area. Initiation of the VERP process should be clearly identified as among the highest priorities for GMP implementation and should at least be underway prior to any future construction activities. While NPCA recognizes that Table D-2 is technically focused on construction costs, it is extremely discouraging not to even see the VERP study listed anywhere as a key line item in a list of construction projects that totals $26-$48 million! VERP, of course, will cost a fraction of this amount (in a recent DCP for Bandelier National Monument, VERP studies were projected at 1% of total construction costs), and could deliver incredibly valuable information that might actually save NPS a great deal of money. VERP-style work is a legal obligation for NPS that has not been met for Carlsbad Caverns National Park. NPCA will not consider its support for the GMP to be unencumbered until it receives much more concrete assurances from NPS that VERP studies will come first and that any actual development activity will fit with these requirements. NPCA, of course, supports implementation of all interim measures to address carrying capacity pending completion of the VERP process. (p. 50)

NPCA supports proposals to redesign the Visitor Center and improve interpretation programs overall. Proper orientation for every visitor is critical to resource protection in the Caverns. The situation must also be changed in which the area in the Visitors Center given over to concessions operations is nearly four times the area devoted to interpretation. A new vista overlook and a new trail along an existing disturbed area (the old guano road) will add a new dimension to the hilltop area. Any new picnic area should be sized appropriately to the VC area. (Is the roof an option?)

General Development

NPCA supports the approach recommended by NPS to complete the infiltration studies to determine threats to cave resources from surface activities and facilities near the cave entrance area prior to final decisions about facility relocation. The infiltration study is the key to establishing a scientific basis for removal of facilities from above Carlsbad Caverns, and is probably one of the best uses of $50,000 the NPS has made at the park. NPCA questions, however, whether a five-year hazardous materials study is really necessary. NPCA expects that resolving the larger questions about the links between infiltration and facilities over the cave will affect the location, usage, and storage of most hazardous materials.

NPCA favors a cautionary approach that analyzes the risks to the cave from above-ground facilities, and weighs the costs of technological approaches/mitigation, and partial and full and removal. We can, however, support eventual complete of most of the construction projects associated with Alternative 2 and listed in the first half of Table 2-D (with the exception of some projects noted elsewhere in these comments, and subject to some additional concerns discussed below under Implementation). It also seems likely, however, that some key projects -- such as relocation of the maintenance, administration, and living quarters -- will be desirable for many reasons in addition to the opportunity to reduce risks to the cave, and they will need to be completed eventually. NPS has had some partial success in these kinds of endeavors at other

**RESPONSES**

6. The outdoor eating area you refer to would be designed in detail later in conjunction with other visitor center improvements. A location adjacent to and on the same floor as the visitor center restaurant/snack bar would probably be preferred.

7. References to a separate comprehensive hazardous materials study have been deleted. As you suggest, the ongoing infiltration study is expected to answer many existing questions regarding the infiltration of hazardous materials and their potential or current effects on cave resources. Once the infiltration study has been completed, the park will evaluate its knowledge base to determine whether it has sufficient information to draw conclusions about the appropriateness of different types of surface facilities and activities near Carlsbad Cavern.

8. It would be premature to refer to national park system areas where major park redevelopment (or relocation of facilities) has been approved or carried out. Although the relocation of major facilities or functions could eventually happen at Carlsbad Caverns, it is also possible that such steps will not be necessary. The Park Service, particularly in the current fiscal climate, has an obligation to also evaluate less extreme measures to determine whether cave resource threats can be reduced to an acceptable level.
As noted on page 53 of the draft document, the park would consider a long-term lease agreement with private entities in Whites City or Carlsbad to provide housing.

It is important to locate the proposed ranger residence so that its visual intrusion on Slaughter Canyon is minimized. Note that the plan recommends that the residence be placed just inside the park boundary, roughly a mile from the Slaughter Canyon trailhead/parking area. This location was chosen (1) to minimize its visual impact on the Slaughter Canyon area, (2) because it is out of the Slaughter Canyon floodplain, and (3) because it would permit the ranger to monitor use of the Yucca Canyon road too. See appendix E for facility design guidelines that also address visual quality concerns.

Rattlesnake Springs is recognized as a national historic district listed on the National Register of Historic Places, and it is also special for its natural resources. The proposed action calls only for expanding existing wayside exhibits near the Rattlesnake Springs picnic area to interpret the natural and historical resources of the area (see page 52 of the draft). This management strategy would allow the Park Service to maintain and preserve historic features while enhancing biotic resources. However, no action would be taken until studies on the area’s resources have been completed.

The idea of relocating residences to Rattlesnake Springs was rejected for resource and other reasons (see “Alternatives and Actions Eliminated from Detailed Study” for additional details).

It is not clear which right-of-way could become a second access road from White’s City since no such road would be required or desirable under the proposed action (alternative 2). Alternative 3 would include a new road on private land in Whites City for access to a transit/orientation center, as discussed on page 67 of the draft document. If you are referring to a 1963 provision in PL 88-249 (77 Stat. 819), that road is neither required nor proposed.
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wilderness study areas. While the GMP notes that studies have taken place since the 1920s, the
details are that NPS studies in 1934, 1940, 1945 and 1984 recommended that segments of this
area be included in Carlsbad Caverns National Park. The area was also recommended to
be designated as a national recreation area by the Carlsbad Chamber of Commerce in 1971.

Plan Implementation
NPCA supports a phased approach to GMP implementation that would put priority on scientific
studies need for sound decision-making, easily implementable actions with significant beneficial
resource impacts, and key maintenance and interpretation needs. Projects identified for Phases II
and III would be accomplished as relevant information and funding became available. Much of
what the NPS is proposing NPCA considers to be the minimum steps necessary to manage
Carlsbad Caverns National Park. As stated above, NPCA believes that VERP studies should be
elevated to a Phase I priority, and that protecting and restoring the biological values of
Rattlesnake Springs also deserves more immediate attention.

There are issues, however, that NPS should grapple with before finalizing this GMP. While
NPCA recognizes that resolving many of the park’s major problems will take hard construction
dollars (and that many of the construction projects could be considered “resource management”),
at this point the draft seems less a comprehensive plan for fixing those problems than a simple list
of construction projects. This effect is heightened when NPS presents a $50 million list of
construction items, and only limited information on research and resource management needs --
sometimes none at all.

The long-term preservation of Carlsbad Caverns National Park perhaps can be found in the
Resource Management Plan. As much as in the next GMP. The entire project list from the park’s Resource
Management Plan should also be included as part of the GMP price tag, and prioritized in comparison with the
bricks and mortar projects. NPCA is also extremely concerned about the future uncertainty regarding future funding for research and resources management versus construction. The result
of silence on some of these matters is that numerous projects critical to meeting the park’s legal
mandate -- protect the resources first and foremost, then serve the visitor -- never seem
important to enough people, including the NPS itself. Consequently critical work
never gets funded and accomplished.

How much will the reptile/amphibian study cost? How much will it cost to reintroduce desert
bighorn? What is needed to better coordinate land management with other agencies? What is the
estimate for the actions that will be necessary to halt degradation and improve visitor management
in Carlsbad Caverns? NPS needs to make it more clear that devoting adequate funds to actual
resource-related problems. The phasing plan for the proposed action (appendix D) places many resource-related studies in phase I, the
highest priority for funding and implementation.

To reinforce the need for resource-related studies, a list of studies
recommended by the proposed plan is included in appendix D of the
final document. Under the “Plan Implementation Costs” section a
statement has been added that funds for studies are also needed but
have not yet been estimated, although a range of likely costs has been
included.

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13. The Rattlesnake Springs studies have been moved to phase I of
implementation. Park resource managers came to the same
conclusion independently during review of the draft document.

both require that conceptual-type (class C) construction cost
estimates be included in general management plans. Class C cost
estimates are based on historic information gathered from similar
NPS construction projects. There is no similar requirement for
including the costs of studies recommended by general management
plans, probably because past studies are of limited use in estimating
the cost of future ones. With few exceptions, the scope and detail of
studies must be tailored to the particular park or situation. This
means that it is difficult to estimate costs without a considerable
amount of time and effort, effort that would be more appropriately
applied when a scope of work or request for proposal is prepared.

Not having cost estimates for studies recommended in the proposed
plan does not make them less likely to be funded. Studies are
generally funded out of different sources and rarely compete directly
with construction projects. The park’s purpose and significance
statements, the list of planning issues, and the proposed action
provide clear support and justification for studying and addressing
resource-related problems. The phasing plan for the proposed action
(appendix D) places many resource-related studies in phase I, the
highest priority for funding and implementation.

To reinforce the need for resource-related studies, a list of studies
recommended by the proposed plan is included in appendix D of the
final document. Under the “Plan Implementation Costs” section a
statement has been added that funds for studies are also needed but
have not yet been estimated, although a range of likely costs has been
included.
NPMA comments on draft GMP/EIS
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Outlined in the GMP could soak up a good deal of available capital from the public and private sectors. It is time NPS articulated the need for these other needs as on par with repaving the entrance road or replacing the elevators. How about a resource management surcharge on every construction project?

Another major problem, of course, is that the GMP is the ideal world, but may have limited relevance to the real world. Construction costs could range from $14 million (no action alternative) to $35 million (alternative three). The preferred alternative estimates construction costs at $26-$49 million and calls for 51 additional full-time employees, which would add over $4 million (in 1995 dollars) to the park's annual base budget. Right. So what do we do the day after the GMP is approved? Sadly, NPS is more likely to be RIFing employees than hiring them.

There may be some ways of addressing these shortcomings. The first is that there needs to be more consideration of short- and long-term contingency plans. NPS needs to identify what happens in the event of a real no action alternative, or what happens if only partial implementation is possible. NPS should give some sense of what tough decisions will be made to protect the resources in the face of funding shortages -- or no new funding whatsoever. In the face of critical shortfalls for NPS, can (or should) we place the emphasis on wholesale relocation park infrastructure? As the GMP describes, no action is really not an option. Replacement of park water lines, and preventing the worst threats to the caves is an absolute necessity if visitors are to be served. But if funds are not forthcoming for certain work, is the NPS prepared to allow degradation in Carlsbad Caverns to continue indefinitely without addressing problems in other ways? In the face of significant construction funding shortages, just how important will spending millions on relocating facilities be versus other priorities? These are the very real questions that remain unanswered in the GMP, but are essential to NPCA judging the adequacy of this plan.

NPMA has some optimism, however, that certain of the park's most pressing needs can be met through concerted effort and partnerships between the public and private sector. Assuming, for example, that alternative two was implemented in its entirety (with relocation of hill top facilities), NPS would need an average of $3.3 million more per year over the fifteen year life of the GMP. These needs might be met through a variety of ways -- from volunteerism to corporate or community support. Therefore, NPCA suggests that NPS place more emphasis on the topics mentioned in the very last paragraph on page 63 (partnerships, use of volunteers, potential new sources of revenue, etc.)

NPS needs to consider how to implement the objectives of this GMP like a general would approach operating beyond his or her supply lines. In the future, NPS will be forced to make maximum use of the countryside around it. Just as one example, an explanation of potential revenue from the new concessions contract would be a helpful addition to the GMP and might reduce some of the GMP sticker shock.

In preparing the plan, the planning team looked at current park obligations and needs, as well as future needs, recognizing that budgets are tight today and that there are shortfalls in the park's current operational programs. Political and economic forces could affect implementation of the plan, but it is not possible to predict how these forces would change over the life of the plan. Because funds would not be available to implement all of the proposed management actions at once, actions were prioritized in three phases (see page 192 of the draft document). Additional options were identified if funding and staffing for some elements were unavailable (see page 63).
In summary, NPCA would commend NPS for a decent job on this GMP, but would also emphasize that the buildings and the construction list are not really the GMP, but the condition of the resources and perhaps some of the things discussed in the last paragraph on page 63 really are.

Thank you for considering the association's views.

Sincerely,

David J. Simon
Southwest Regional Director
Dear Planning Team Leader,

Thank you for extending the period for public comment to March 25, 1996, to enable a more thorough evaluation of the Draft EIS by the National Speleological Society, Inc.

As Conservation Chairman for the NSS, I want to extend my congratulations on completing a thorough evaluation on how to best manage the Carlsbad Caverns cave resources for the next 10 to 15 years.

As Conservation Chairman, I fully support the preferred Alternative 2. I do appreciate the fact that the proposed plan would base resource management and visitor use decisions on scientific research, inventory, and monitoring of the cave resources. Following the data gathering phase, you will most likely find that human activities and visitation are having the greatest impact on the cave resources, and that the appropriately controlled surface facilities will have only a minor impact on those resources.

I understand the monitoring study in Carlsbad Caverns revealed the loss of an estimated 18,480 cave formations between 1985 and 1993. Such removal of a few formations multiplied by thousands of such incidents has had a devastating effect on even the most spectacular of America’s caves.

Some caves prefer Alternative 3, calling for the removal of many surface functions and facilities from directly above the cave. But it is difficult to justify such a radical movement of facilities without doing the research first. The NSS supports the research efforts discussed in Alternative 2, and offers the expertise of the hundreds of speleologists within the National Speleological Society. The NSS


1. Your offer of assistance in the future is appreciated. Members of the National Speleological Society have made significant contributions to understanding and protecting park resources.
1. Membership contains the largest collection of cave research scientists in the world, and we hope you will consult with our experts in all speleological disciplines.

2. Some specifics I would like to address:
   1. I understand that some water infiltration studies have already been initiated by non-cavers. I would encourage you, in the future, to contract such critical studies to the most experienced cave scientists available.
   2. Under Alternative 2, Lechuguilla Cave (p. 10) states: "An airlock would be installed at the cave's artificial entrance (a 20-foot [6.2m] tunnel) to reduce unnatural patterns of air exchange. It would be designed to ensure that cavers could not be inadvertently locked within the cave."

   On March 20, 1990, Mike Reid and I supervised the installation of the new airlock on the Lechuguilla Cave culvert. We welded up a solid steel airlock and added 4' of culvert, making the total length 16' (not 20'). Funding for this airlock was provided by the Sandia Grotto, NSS. If the present airlock is leaking, it may be because the rubber seal needs to be replaced. The present airlock is designed so that if a caving crew is accidentally padlocked in the cave, they can release the locking mechanism from inside and get out of the cave. Therefore question the need for a new airlock. Perhaps the above reference is to installing a second airlock? At the bottom of the culvert? This would be difficult to manipulate, unless the bottom airlock is very light weight, and perhaps spring loaded to easily close behind a caver exiting the cave. I would appreciate more information on this subject.

3. The greatest danger of trapping a caving crew in Lechuguilla Cave comes from the unstable slope immediately above the airlock. If this breakdown slope collapsed, it would cover the present gate/airlock with breakdown and any people inside would be unable to dig themselves out. I recommend that the breakdown slope above the gate be stabilized, perhaps with wire mesh and spray on concrete that can be covered with cave dirt and rock to make it appear natural. Please comment.

4. "A feasibility study and assessment would be conducted to determine the impact of developing visitor access to Ogle Cave." (p. 41). I have thought for many years that Ogle Cave could very easily be developed for visitation by completing the mining tunnel (an additional 300' of tunneling). Ogle Cave is a very spectacular cave, and would be an interesting guano mining exhibit. Tours of Ogle Cave would open the beautiful Slaughter Canyon area to visitation, and provide some relief to Carlsbad Caverns visitation. Trails can be laid out within Ogle Cave so that visitors have no opportunity to touch or remove speleothems. I enthusiastically support this project.

2. The Colorado School of Mines' International Ground Water Modeling Center was contracted to conduct the cave infiltration/hazard study in consultation with the NPS Water Resources Division, following approved federal contracting procedures. For this study expertise in karst hydrology was needed. Although there are undoubtedly cave scientists who have expertise in this area, such expertise is not limited to cave scientists.

3. There are problems with the present Lechuguilla Cave locking mechanism, which is different from the one installed in 1990. In response to your comment, the text has been clarified. Currently it is not possible to exit the culvert if the lid is locked, and anyone who is in the cave when the lid is locked could be trapped until the lid was opened from the surface. Also, when the lid is opened, air blasts through the opening, pelting anyone entering or leaving the cave with small dirt and debris particles.

4. You are correct in pointing out the potential hazard to cavers from the unstable slopes near the airlock/culvert. After rains, rocks and boulders sometimes roll down onto the culvert lid and sometimes materials collapse at the bottom, below the culvert. The park plans to conduct a study/environmental assessment to evaluate possible improvements to the present Lechuguilla Cave airlock/culvert system. The study would probably evaluate ways to protect the cave from unauthorized entry, stabilize the slopes above and below the culvert, reduce rapid airflow that can present a safety hazard and alter cave air conditions, and possibly address the question of whether the existing culvert is the best way of accessing the cave. Your suggestion for how to stabilize the slope will be considered during the environmental assessment process. Input from cavers will be solicited when this study/environmental assessment is initiated.
5. In the past five years much new information has been collected about many of the park's backcountry caves. Much of this work has been done by volunteers. Cave survey standards and guidelines for entering park caves have been recently developed and provide guidance for collecting such information. The gathering of baseline data on backcountry caves continues, and volunteers will continue to play an integral role in this effort. Additional survey of Carlsbad Cavern is also needed, however, and volunteers will likely play an important role in this work as well. A renewed emphasis on enforcing survey standards should lead to the collection of better survey data and possibly the discovery and documentation of more passages in Carlsbad Cavern.

Thank you again for extending the public comment period on this document. The NSS supports your recommendations in Alternative 2, and offers its assistance in carrying out the necessary research. We sincerely appreciate your effort to wisely manage these nonrenewable cave resources.

Sincerely,

David Jagnow, NSS President
NSS Conservation Chairman

cc: Frank J. Decker, Superintendent
Carlsbad Caverns National Park
3223 National Park Highway
Carlsbad, NM 88220
caca_cave_resource@nps.gov

David Luckins, NSS President
Dr. Fred Wafer, NSS Executive Vice President
Planning Team Leader
Carlsbad Caverns General Management Plan
National Park Service/Denver Service Center
P.O. Box 25287
Denver, CO 80225-0287

April 25, 1996

Gentlemen:

Thank you for extending the period for public comment to March 25, 1996, to enable a more thorough evaluation of the Draft EIS by the National Speleological Society, Inc.

On behalf of the National Speleological Society, I want to extend our congratulations on compiling a very thorough evaluation on how to best manage the Carlsbad Caverns cave resources for the next 10 to 15 years.

The NSS is supportive of the preferred Alternative 2. We appreciate knowing the proposed plan would base resource management and visitor use decisions on scientific research, inventory, and monitoring of the cave resources. It is the judgment of our experts that, following the data gathering phase, you will find human activities and visitation are having the greatest impact on the cave resources, and that appropriately controlled surface facilities will have only a minor impact on those resources.

I understand the monitoring study in Carlsbad Caverns revealed the loss of an estimated 18,480 cave formations between 1985 and 1993. Such removal of a few formations multiplied by thousands of such incidents has had a devastating effect on even the most spectacular of America's caves.

Many of our members may prefer Alternative 3, calling for the removal of many surface functions and facilities from directly above the cave. Such a decision may be appropriate, but it is difficult to justify such a radical movement of facilities without research based knowledge. The NSS supports the research efforts discussed in Alternative 2, and offers the expertise of the hundreds of speleologists within the National Speleological Society. The NSS membership contains the largest collection of cave research scientists in the world, and we hope you will consult with our experts in all the speleological disciplines. It is our understanding that some
COMMENTS

TO: Planning Team Leader  
Carlsbad Caverns General Management Plan  
National Park Service/Denver Service Center  
P.O. Box 2587  
Denver, CO 80225-0287

water infiltration studies have already been initiated by non-cavers. The NSS encourages you, in the future, to contract such critical studies to the most experienced cave scientists available.

Thank you again for extending the public comment period on this document. The NSS is supportive of your recommendations in Alternative 2 and offers its assistance in carrying out the necessary research.

Sincerely,

[Signature]

David Luckins, President  
National Speleological Society

cc: Frank J. Deckert, Superintendent  
Carlsbad Caverns National Park  
3225 National Parks Highway  
Carlsbad, NM 88220  
caca.cave-resources@nps.gov

David Jagnow, NSS Conservation Committee Chair  
Dr. Fred Weier, NSS Executive Vice President

RESPONSES

CONSULTATION AND COORDINATION
Planning Team Leader
Carlsbad Caverns General Management Plan
National Park Service/Denver Service Center
P. O. Box 25287
Denver, CO 80225-0287

Dear P. T. L.:  

Thank you for opportunity to comment on the Draft Plan. We are a small, state-wide group of biologists who have worked since 1977 to protect New Mexico’s natural features.

We are unable to judge how pressing are the impacts of surface use on cave resources, so have no basis for urging the faster protection afforded by Alternative 3, although that would be our inclination.

However, whatever protections are required, we hope that private-vehicle access to surface features of the Park—notably Walnut Canyon Desert Drive—will continue for as many years as possible. In its (proper) concentration on protection of cave resources, NPS may overlook the fact that this is the most important opportunity anywhere for visitors to see a protected Chihuahuan succulent desert. Therefore we strongly favor the Proposed Alternative’s development of two additional interpretive trails and improvements on hiking trails.

Sincerely,

Roger S. Peterson
Secretary
Dear Sir;

I am writing to you on behalf of the members of the Sandia Grotto, a caving organization located in Albuquerque, New Mexico, affiliated with the National Speleological Society. After reviewing the Draft General Management Plan/Environmental Impact Statement, the grotto membership wishes to go on record as supporting Alternative Two, the proposed management plan. We have the following comments about specific sections of that proposal:

**CARLSBAD CAVERNS NATURAL RESOURCE MANAGEMENT**

Subsurface Resources:

We believe the hazardous materials study of the effects of structures above the cavern should be given the highest priority in park planning for the immediate future. If such studies indicate that removal of structures above the cavern is prudent to protect the cavern, we support plans for such removal.

Lechuguilla Cave:

We would like to see a comprehensive plan for addressing the human waste and other damage in Lechuguilla as a result of its exploration. Much needs to be done in the way of restoration and decontamination to protect the sensitive cave environment and to reverse prior impacts. The membership of Sandia Grotto would be willing to contribute person hours and coordinate projects in the interest of cleaning up areas of Lechuguilla which have been impacted.

Other Caves:

The grotto does not support commercial development of Ogle Cave. We believe ample opportunities already exist for visitors enjoyment of the park’s resources. Ogle should retain its current designation as a "wild" cave, perhaps Slaughter Canyon Cave could be managed in a different way to increase visitor use and enjoyment.

The members of Sandia Grotto are pleased to see much effort going into the plans for Carlsbad Caverns National Park’s future. The caves of the Guadalupe Mountains are in our back yard, and we are very interested in their management and conservation. We are anxious to contribute in any way necessary to see that this rich subterranean resource is protected and developed in a responsible way.

Thank you for considering the Grotto’s comments on this Management Plan.

Sincerely,

Brian Gallmuth
President, Sandia Grotto

c: Chris Lee, NPS SWR Chair

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**RESPONSES**

1. The infiltration/hazard study is a high priority for completion.

2. Your offer of assistance in cleaning up areas of Lechuguilla and in preparing and implementing a rehabilitation plan for Lechuguilla Cave is appreciated. A plan to address past impacts to Lechuguilla Cave resources would be helpful, and the proposed action has been revised to include this action. However, as more people enter the cave to assess damage and restore it, the more potential there is for additional impacts. Until a rehabilitation plan can be prepared, the park will continue to address the most pressing resource impacts on a case-by-case basis. Human waste disposal is a problem. Studies considering alternative ways of disposing of human urine in the cave to prevent future contamination are currently underway.

3. There are over 80 caves known in the park, but currently most visitors have opportunities to visit only Carlsbad Cavern, Slaughter Canyon Cave, and Spider Cave. Ogle Cave could provide visitors with another opportunity to enjoy the park’s special resources. It might not be feasible to improve access to the cave, and increased visitation could pose unacceptable risks. Alternative 2 has been revised to call first for a need assessment to determine if visitors desire the type of cave experience that could be offered at Ogle Cave and to look at the cost effectiveness of providing improved visitor access. If necessary, a subsequent study would assess the feasibility and impacts of developing visitor access to Ogle Cave. As phase III actions, these studies are not scheduled to be undertaken for 10–15 years, until higher priority actions had been taken to protect park resources.
February 23, 1996

Planning Team Leader
Carlsbad Caverns General Management Plan
National Park Service / Denver Service Center
P.O. Box 25287
Denver, CO 80225-0287

RE: Draft General Management Plan / Environmental Impact Statement Carlsbad Caverns National Park

Dear Planning Team,

We have studied the document entitled Draft General Management Plan / Environmental Impact Statement for Carlsbad Caverns National Park and would like to thank you for this opportunity to make a few brief comments. The main scope of our response will be to address some of the surface resource questions of primary concern to our membership. The El Paso Regional Group of the Sierra Club has always been a companion along your journey to protect and preserve this great natural and national resource. We have long been a staunch supporter of the wilderness status enjoyed by the Park. This support has been expressed in political action and in the commitment shown by our members to work on Park projects as partners with staff.

We would like to draw your attention to our belief and management approach for the Park and associated resources. This approach may at times support or contradict the suggested alternatives and we urge your further considerations of the positions we advocate.

<table>
<thead>
<tr>
<th>Fiscal Management Issues</th>
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<tr>
<td>At the present, the Park is not sufficiently funded and staffed to meet all its management and resource protection needs. Given this situation, we feel many items in the proposed alternative, while noteworthy, may, in this time of budget cutbacks, further overwork the Park’s fiscal and personal resources. The need to address the shortfalls in current Park operational management resources should be of prime importance. Therefore, we urge a reexamination of the current obligations and needs of the Park prior to the commencement of new programs initiatives.</td>
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<th>Native Animals</th>
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<td>The continuation of Barbary sheep removal process is a critical goal in the ecosystem management of the Park. This removal must be accompanied by the completion border fencing around the Park. This would help to reduce a variety of the problems associated with Barbary sheep mobility across Park borders.</td>
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"To Explore, Enjoy and Protect the Earth."

1. The purpose of a general management plan for Carlsbad Caverns is to set forth the general direction and management philosophy the Park Service intends to pursue in managing the park over the next 10 to 15 years. In preparing the plan, the planning team looked at current park obligations and needs, as well as future needs, recognizing that budgets are tight today and that there are shortfalls in the park’s current operational programs. Political and economic forces could affect implementation of the plan, but it is not possible to predict how these forces would change over the life of the plan. General management plans do not guarantee funding, but rather provide the rationale and priorities for future funding requests. Most of the management actions in alternative 2 are necessary to achieve the Park Service’s mission and the purposes for which Carlsbad Caverns National Park was established. Because funds would not be available to implement all of the proposed management actions in the plan at once, actions were prioritized in three phases (see page 192 of the draft document). Additional options were identified if funding and staffing for some elements were unavailable (see page 63).

2. As noted on page 18 of the draft document, the park’s 1994 Resources Management Plan calls for fencing the remaining 10 miles or so of boundary that have not yet been fenced.
COMMENTS

The natural expansion of the Swallow range to include the Park would be an invaluable evolution worthy of study. We worry that the expansion of Swallow habitat range is a function of cavern lighting. Thus, we support the study and development of lighting more in harmony with the caverns.

Animal Reintroduction
While we support program initiatives that reintroduce traditional native species into the Park ecosystem, we would like to express concern that the Bighorn sheep reintroduction would be a serious drain on the Park's financial and personnel resources. The impact of the intensive development associated with this specific reintroduction has not been addressed to our satisfaction.

Guadalupe Ridge Trail
The trail is noted in the GMP/EIS as a "primitive road" within the Park but outside of the wilderness protection area. Protecting wilderness values in this part of the Park can be facilitated by closing the trail to vehicular traffic. We have, since the 1970's, consistently advocated the elimination of motorized traffic along the trail. This action would help to reduce the "messinger" of the trail, as noted in the GMP/EIS. There is no justifiable need for a user permits for open access roadway in this area. The beginning of the roadway might possibly have to be gated or fenced especially at Putman Cabin, to prohibit entrance and assure resource protection.

The eventual incorporation of the area north of the Ridge into the wilderness status area has and will continue to be a long-term goal of our organization. We anticipate working with the Congressional Delegation at an appropriate time to develop and introduce the necessary legislation.

Walnut Canyon Drive
The resurfacing of Walnut Canyon desert drive should be delayed. We recognize and appreciate the efforts outlined in Alternative 2 to improve road surface conditions. That the operation can be accomplished so as to allow continued water infiltration, and without hydrocarbon introduction is commendable. The use of Walnut Canyon desert drive by permit is our preferred alternative. This would allow the monitoring of traffic and the potential for education related to travelers in the area. The need for access can be accomplished by the use of alternative routes.

Backcountry Trails
The trails of the backcountry have fallen into a forlorn state of disrepair. The report itself notes that "the trail system is in poor condition due to erosion and infrequent repair." The trail system is an existing surface asset of considerable importance. We firmly urge you to place a stronger emphasis on trail maintenance and upkeep.

The suggestion for closing certain trails in the hope of achieving a rotation and encouraging alternative use is a noble concept. We would be supportive of such actions if they are carried out in consultation with public groups such as ourselves or New Mexico Wilderness Coalition. This would allow you to utilize the resources and knowledge of the primary visitors to this area.

RESPONSES

3. The reintroduction of desert bighorn sheep is not addressed because the action is addressed in the park's Resources Management Plan and Environmental Assessment, which also assesses the possible environmental effects. Park managers are unaware of the "intensive development" you refer to, but the reintroduction would not be a "serious drain" on the park's financial and staff resources. The Resources Management Plan assigns the reintroduction a relatively low priority; higher priority actions would be funded before this action. If and when the reintroduction effort begins, the Park Service would work cooperatively with the state game department to conserve resources.

4. There is no evidence that motorized use of the Guadalupe Ridge trail is adversely affecting wilderness values in the park. The trail receives little motorized use and is not expected to receive much higher use in the near future. The trail provides the only vehicular access to Lechuguilla Cave. Thus, there is no need to take the action you are proposing at this time. However, if vehicles were determined to be causing serious resource impacts along the ridge, gating the road would be considered, after consultations with the U.S. Forest Service and the Bureau of Land Management.

5. Resurfacing of the Walnut Canyon desert drive is proposed to reduce current adverse effects on roadside vegetation from dust and gravel and to prevent a gradual widening of the road corridor. Establishing a permit system in lieu of resurfacing would not stop these impacts or the generation of dust. Obtaining a permit would cause visitors some inconvenience, as well as take up staff time. Finally, given limited staff, it would be difficult for the Park Service to effectively enforce a permit requirement.

6. There is a need for more trail maintenance and upkeep work, and your assistance in the future in improving park trails would be welcome. The proposed action notes that closing certain trail segments and reopening others in the backcountry would be considered. Before taking any such actions, user groups — including the Sierra Club and the New Mexico Wilderness Coalition — would be consulted.
methodology of this operation is very important and could result in improved opportunities for hiking in the future. We are, as we have done previously, most willing to engage in service activities to assist in trail maintenance and upkeep. This partnership has worked in the past, on such activities as the maintenance of the Middle Slaughter Canyon Trail, the Yucca Canyon Trail, and the painting of Potassan Cabin. The need for the expansion of such partnerships is addressed on in the GMP/EIS. We hope to be of assistance in the future on improving trail conditions within the Park.

**Ranger Activity**
The report discusses the possibility of establishing a ranger station and stationing rangers near the Slaughter Canyon trailhead. While we would normally support such a proposal, we feel obligated to balance this need with the current fiscal and administrative obligations of Park management. Thus at this time we can not support this additional initiative.

An alternative we would propose is the stationing of a "backcountry" ranger in the existing facility at Rattlesnake Spring. This would better utilize the Park's current facilities without creating a new administrative staffing outposts. The provision of a backcountry ranger, responsible for the Slaughter Canyon area, would also help address the needs for backcountry revitalization and monitoring. The ranger would also serve as a focal point of developing cooperation with Forest Service and BLM enforcement efforts.

**Slaughter Canyon**
The creation of a ranger residence at Slaughter Canyon, as previously noted, is not an initiative we support at this time. There does exist a long term need for monitoring in the Slaughter Canyon area, but we continue to believe that the placement of additional staffed facilities is not fiscally responsible given current Park obligations.

The placement of informational kiosks should be consistent with the principle of minimizing new facility placement in wilderness areas. While that in mind we urge that informational kiosks, if constructed, not be located at the Slaughter Canyon trailhead. The informational kiosks would better serve Park needs if placed near Hwy 62/180 and the Slaughter Canyon access road. This would help to reduce the potential hazard of locating the information Kiosks in a probable maximum floodplain. Visitors traveling Hwy. 62/180 could then stop and obtain information without traveling the access road.

**Carlsbad Caverns**
The protection of Carlsbad cavern is of prime importance. Many of the corresponding protections granted the surroundings are due to its significance and notoriety. The reduction of opportunities for self-guided tours is probably the most effective way to guarantee cavern safety while allowing continued visitor access. This should not be viewed as a hindrance to visitor flow, but as an effective deterrent for intentional or senseless degradation.

7. Stationing a ranger at the existing facility at Rattlesnake Spring would not save money because the existing residence is not large enough to house another person, and a new facility would have to be built, with potential adverse effects on the historic district's cultural landscape. In addition, a Rattlesnake Springs location would significantly reduce the effectiveness of the ranger in monitoring park backcountry use, issuing backcountry permits, providing information to backcountry visitors, protecting resources, and being able to quickly respond to emergencies. As noted in the draft document, providing a ranger residence on the road to Slaughter Canyon would provide for improved backcountry management, better monitoring of backcountry use, and overall reduced resource impacts. Establishing a new ranger station is a phase III action and would not occur for 10 to 15 years (see page 192 of the draft document).

8. The proposed expanded informational kiosk at the Slaughter Canyon trailhead would not be in wilderness and would not adversely affect wilderness values. The purpose of a kiosk is to provide additional information for backcountry users or visitors who have reservations for the Slaughter Canyon Cave tour, not to provide information for general park visitors. Placing a kiosk near U.S. 62/180 would be outside the NPS boundary and would require the construction of a pullout/parking area.

9. The Park Service is charged with both protecting Carlsbad's resources and providing opportunities for visitors to enjoy the resources. One of the elements that makes a trip into Carlsbad Cavern special for many visitors is the chance to "explore" the cave at their own pace while remaining on the designated cave trail. Reducing opportunities for self-guided tours would reduce the potential for visitor impacts, but would also significantly alter the quality of many visitors' experiences, particularly if they had to wait long periods to go on guided tours. As noted on page 138 of the draft document, the actions proposed in alternative 2 (e.g., posting NPS staff at key locations, improving visitor education programs to increase public awareness about impacts, increasing monitoring of visitors) would help reduce impacts to cave resources and still provide opportunities for self-guided tours. However, the proposed action also provides the option to institute guided tours along the natural entrance route if unacceptable levels of impacts continue.
The pathways of the cavern must be resurfaced with non-foreign material. There is no need to wait on additional studies that demonstrate the harmful effects of asphalt and hydrocarbon disintegration. The effects have been long demonstrated and no further rationalization exist for delays or additional discussion and study. The pathways should then be surfaced with materials that will not cause degradation and are hygienically natural to the cavern. Trails should primarily be realigned to reduce opportunities for visitor malevolent contact, not improving traffic flow. The cleaning of trails must be modified so as to minimize hazards of this activity.

Ogle Cave
The need to allow expanded access to Ogle cave has not been established. We oppose the study and assessments to determine the impacts of visitor access to Ogle cave. Visitor access would only begin the process of exploitation of the Ogle cave. The completion of the existing partial tunnel is totally unacceptable and inherent to the concoctious principles of Park management. This proposal, we believe, is an over extension when existing commitments to protecting Carlsbad Cavern have not been met. This project would require the addition of a new surface trail, further intruding on surface resources.

Entrance Road
We would encourage you to schedule activities related to road improvements when the Golden Eagles are not in or near nesting. This action would significantly reduce the possibility of contributing to a potential for damage to their environment.

Cavern Support Activities
The movement of surface facilities as outlined in Alternative 3 is by all accounts too expensive an undertaking at the present time. Therefore we urge you to implement the principal of “reducing or eliminating threats to cave resources”. This could be accomplished by not engaging in improvements and further enhancement of current facilities. The planning and direction of available resources should be directed at the reduction of potential hazards to cave assets. This will help to ensure the long term protection of Carlsbad cavern while preparing for the movement of support facilities to a less dangerous location.

Given the current realities of Park support resources we, with the noted exceptions, primarily support Alternative 2. In conclusion we urge you to examine your approach to this great asset whose management and care you have been entrusted. The nature of the approach should holistic in nature and incorporate the best long term Park ecosystem protection possible. That will ensure the status of Park resources far into the next century. Thank you for your time and consideration.

Sincerely,

C. Wesley Leondard, Vice President, El Paso Regional Group of the Sierra Club

10. The trails in Carlsbad Cavern have an asphalt base with a surface covering of epoxy resins and emery chips for better traction. Based on discussions with cave resource experts, it appears that asphalt stops losing hydrocarbons about two years after it has been applied. Thus, the asphalt in the cavern is believed to be relatively benign where it is covered and sealed. The revised alternative now states that old asphalt that is exposed to air will be removed or sealed. A study is proposed to investigate the effects of the existing epoxy resin/emery chip surface on the cave and to identify alternative trail surface materials that would provide traction but not impact the cavern.

With regard to realigning trails, reference to improving traffic flows has been deleted from the text. The revised text now states that some trail sections would be realigned or modified to reduce impacts from vandalism.

11. There are over 80 caves known in the park, but currently most visitors have opportunities to visit only Carlsbad Cavern, Slaughter Canyon Cave, and Spider Cave. Ogle Cave could provide visitors with another opportunity to enjoy the park’s special resources. It might not be feasible to improve access to the cave, and increased visitation could pose unacceptable risks. Alternative 2 has been revised to call first for a need assessment to determine if visitors desire the type of cave experience that could be offered at Ogle Cave and to look at the cost effectiveness of providing improved visitor access. If necessary, a subsequent study would assess the feasibility and impacts of developing visitor access to Ogle Cave. Note that alternative 2 categorizes these studies as phase III actions; they would not begin until higher priority actions had been taken to protect park resources.

12. Alternative 2 has been revised to state that improvements to the entrance road would not be scheduled during or near the season when golden eagles could be nesting in the area.

13. Alternative 2 would help reduce or eliminate potential threats to cave resources. The proposed improvements of existing surface facilities (e.g., remodeling the visitor center and resurfacing the Walnut Canyon desert drive) address current problems and concerns and would not pose an additional risk to the cavern.
Alternative 2 as stated in the Draft General Management Plan/Environmental Impact Statement for Carlsbad Caverns National Park is our preferred alternative. As one of the major tourism businesses depending on Carlsbad Caverns visitors for its source of income we are very concerned about any proposal that would reduce the visitation at the caverns. The current visitation does not, in our opinion, endanger the park. In keeping with the National Park Service purpose of providing a range of opportunities for public use, enjoyment and understanding while minimizing impacts on park resources and natural processes, maintaining access to Carlsbad Cavern, Slaughter Canyon Cave, Spider Cave, and other portions of Carlsbad Cavern is essential.

The possible opening of Ogle Cave is certainly in keeping with this purpose. One of the ways to maintain a healthy tourism industry without undue pressure on the main cavern is to provide alternative activities for the public so that fewer people will stay longer in the area. These activities must be of sufficient interest and capacity to make the visitors consider staying an additional day. Ogle Cave would fall into this category.

Removal of the non-historic structures from the escarpment should not detract from the park's purpose. We in White's City will be happy to provide facilities for park employees or functions if it is economically feasible to do so.

Thank you for the opportunity to respond to your proposals.
The public comment period was extended to March 25 to give citizens adequate time to comment.

More than 190 copies of the draft document were distributed to governmental agencies, public interest groups, businesses, media, local libraries, and individuals, mostly in November 1996. Copies were mailed to the current and past presidents of the National Speleological Society, the NSS News, the NSS library, the Conservation Newsletter editor, and numerous other NSS members who have been active in the park in recent years. Individuals in other caving organizations who requested copies were mailed the document. There was no intention of overlooking anyone interested in commenting on the draft, or caving publications such as your newsletter.

Opening Ogle Cave is considered because it could provide visitors with another opportunity to enjoy the park's special resources. Alternative 2 has been revised to call first for a need assessment to determine if visitors desire the type of cave experience that could be offered at Ogle Cave and to look at the cost effectiveness of providing improved visitor access. If necessary, a subsequent study would assess the feasibility and impacts of developing visitor access to Ogle Cave. The feasibility study and impact analysis would evaluate and recommend protective measures for Ogle Cave in more detail, and it would consider an airlock to prevent unnatural humidity, pressure, and other changes in the cave's atmosphere.

The tunnel you mentioned may be eligible for listing on the National Register of Historic Places and is therefore subject to the provisions of the National Historic Preservation Act (which is more applicable than the Antiquities Act). Impacts on historical resources would be one of the subjects of the impact assessment referred to in the plan.
problem, an air lock gate would probably have to be installed. Some kind of gate would have to be installed since you will have created an attractive nuisance and will need to block the way in. In other words, you will be spending big money to create a problem, then spending more money to try to negate the problem you created. That really does not make much sense.

I seriously doubt that there is a need for another "show" cave at Carlsbad Cavern National Park. You do not have the personnel now to keep Slaughter Canyon (aka New) Cave open every day year round, and now you want to open up another area requiring more personnel? Whose idea was this anyway? Giving folks another "choice" will not keep them in the area longer, it will simply make them choose. Ogle Cave does not begin to compete with Slaughter Canyon Cave on its value to the average tourist (seeing pretty formations). The value of Ogle Cave is its historical significance, which is currently being preserved. Let's keep it that way.

Sincerely,

Carol Belski
Carlsbad Caverns General Management Plan
February 21, 1996
Dear Sir:

I have been a caver for 17 years and am a member of the National Speleological Society. As a joint venture for the Cave Research Foundation for the past 5 years, I have done extensive survey and restoration projects in both Carlsbad Caverns and Lechuguilla Cave. Much of my time has been spent visiting numerous back country caves both within the park boundaries and in the Guadalupe Mountains. After reviewing the Draft General Management Plan/Environmental Impact Statement, I support Alternative Two, the proposed management plan. I have the following comments about specific sections of that proposal:

1. The infiltration/hazard study is a high priority for completion. However, until further information is collected and analyzed, it is premature to call for the removal of structures above the cavern. Other developments proposed in alternative 2 would not pose an additional risk of adversely affecting the cavern.

2. A plan to address past impacts to Lechuguilla Cave resources would be helpful, and the proposed action has been revised to include this action. However, as more people enter the cave to assess damage and restore it, the more potential there is for additional impacts. Until a rehabilitation plan for Lechuguilla Cave can be prepared, the park would continue to address the most pressing resource impacts on a case-by-case basis. Human waste disposal is a problem. One study has already shown that human urine can significantly affect cave microbial communities. Studies considering alternative ways of disposing of human urine in the cave to prevent future contamination are underway.

3. There are over 80 caves known in the park, but currently most visitors have opportunities to visit only Carlsbad Cavern, Slaughter Canyon Cave, and Spider Cave. Ogle Cave could provide visitors with another opportunity to enjoy the park's special resources. Ogle Cave could provide visitors with an off-trail experience that could be offered at Ogle Cave and to look at the environmental integrity of the cavern exists in the form of potential contamination from surface sources such as sewer lines and gasoline spills. The hazardous materials study and removal of structures above the cavern should be given the highest priority in park planning for the immediate future. It seems obvious that the greatest physical threat to the environmental integrity of the cavern itself is the form of potential contamination from surface sources such as sewer lines and gasoline spills. The hazardous materials study and removal of structures above the cavern should be given the highest priority in park planning for the immediate future. It seems logical to consider developing other areas in the park when Carlsbad itself is at risk from the feasibility of contamination.

NATURAL RESOURCE MANAGEMENT
Subsurface Resources
It seems obvious that the greatest physical threat to the environmental integrity of the cavern exists in the form of potential contamination from surface sources such as sewer lines and gasoline spills. The hazardous materials study and removal of structures above the cavern should be given the highest priority in park planning for the immediate future. It seems logical to consider developing other areas in the park when Carlsbad itself is at risk from the feasibility of contamination.

Lechuguilla Cave:
I would like to see a comprehensive plan for addressing the human waste contamination and damage which exists in Lechuguilla as a side effect of its exploration. While the proposed new procedures of installing an airlock and having a cave specialist accompany most parties into the cave help to ensure against future abuses of the cave environment, much needs to be done in the way of restoration and decontamination to protect the potable water sources and to reverse prior impact.

Other Caves:
While Ogle Cave possesses features which make it a candidate for commercial development, the appropriateness of such development should be seriously considered. Slaughter Canyon Cave already presents visitors with the opportunity to have a cave experience not occurred in the cavern itself. Perhaps developing Slaughter Canyon Cave further and taking advantage of already existing structures is more sensible than opening up Ogle. Visitors may also take off-trail tours at Carlsbad Caverns, or they can sign up to go to Spider. Abandoned opportunities already exist for visitor enjoyment of the park's resources. It has been pointed out in Alternative Two that management of the park needs to be re-assessed in terms of quality of visitor enjoyment/most protection rather than maximum carrying capacity. The visitor management challenges which exist at CCNP need to be addressed. Adding yet another cave to an already overburdened management program will not make solving these problems easier. In keeping with the VSEP concept, there is no way to measure whether visitor enjoyment of Ogle Cave will ever offset the substantial impact to the cave environment which

RESPONSES

1. The infiltration/hazard study is a high priority for completion. However, until further information is collected and analyzed, it is premature to call for the removal of structures above the cavern. Other developments proposed in alternative 2 would not pose an additional risk of adversely affecting the cavern.

2. A plan to address past impacts to Lechuguilla Cave resources would be helpful, and the proposed action has been revised to include this action. However, as more people enter the cave to assess damage and restore it, the more potential there is for additional impacts. Until a rehabilitation plan for Lechuguilla Cave can be prepared, the park would continue to address the most pressing resource impacts on a case-by-case basis. Human waste disposal is a problem. One study has already shown that human urine can significantly affect cave microbial communities. Studies considering alternative ways of disposing of human urine in the cave to prevent future contamination are underway.

3. There are over 80 caves known in the park, but currently most visitors have opportunities to visit only Carlsbad Cavern, Slaughter Canyon Cave, and Spider Cave. Ogle Cave could provide visitors with another opportunity to enjoy the park's special resources. Ogle Cave could provide visitors with an off-trail experience that could be offered at Ogle Cave and to look at the environmental integrity of the cavern exists in the form of potential contamination from surface sources such as sewer lines and gasoline spills. The hazardous materials study and removal of structures above the cavern should be given the highest priority in park planning for the immediate future. It seems obvious that the greatest physical threat to the environmental integrity of the cavern exists in the form of potential contamination from surface sources such as sewer lines and gasoline spills. The hazardous materials study and removal of structures above the cavern should be given the highest priority in park planning for the immediate future. It seems logical to consider developing other areas in the park when Carlsbad itself is at risk from the feasibility of contamination.
Comentários

Lois Bergthold—Draft General Management Plan/EIS Comments, Page 2

Surface Resources:
Evening closures of Walnut Canyon drive will help to discourage collecting from that area of the park. However, why not take the idea one step further? CCNP is structured in such a way that there is only one road in, and the cave and visitor center are far from the park boundaries. This presents an opportunity to control access to the resources of the park significantly. The plan already proposes development of the park entrance via a new informational kiosk, and also anticipates nighttime patrols of the cave entrance if residential presence is removed from the park. I suggest possibly closing the road into the park completely at night after the bat flight programs are concluded. Install a ranger-monitored booth and electric gate at the entrance. Provide staff members with cards programmed to open the gate automatically to allow access whenever needed. In this way the entire park could be secured at night, virtually eliminating the possibility of illegal collecting and vandalism at the visitor center. This would also eliminate the need for security gating around the cavern entrance, thus allowing the entrance to be returned to a more natural state.

General Development
Visitor Center:
I agree that redesigning the visitor center is urgently needed. Increasing the quality of interpretation sources in the center will do much to promote visitor enjoyment of the park. Reorganization of traffic flow patterns will also help during peak times when everyone is in the visitor center and the noise level is excessive. Using vendor fees to fund some of the improvements in the center is an excellent idea. Concessionaries have benefited from their affiliation with CCNP for decades and have been required to give back very little. This tradition should be terminated.

In conclusion, it is very gratifying to see such a well-constructed document addressing the future management needs of CCNP. On first reading, I supported Alternative Three. But after careful consideration, I realize it is unlikely that so much change would be beneficial to the park if implemented without appropriate research and analysis. Taking a "status quo" approach to resource management is always tempting; I applaud the developers of Alternatives Two and Three for searching beyond what has already been tried and proven.

Thank you for considering my comments on this Management Plan.

Sincerely,

Lois Bergthold

Respostas

4. Your suggestion that the entrance road be gated at night near Whites City has been incorporated into the plan. At this time park managers do not think that conditions warrant closing the road at night, but this measure would be considered if resource or other concerns became more severe. (The action would cause some inconvenience to visitors, cave researchers, and residents and their guests, and it would also place some additional operational demands on park staff.) Even if the park entrance road was closed at night, the security gating around the cave’s mouth would probably not be removed because the entrance road is not the only way to enter the area. The gate was installed in response to serious accidents, including a fatality, that occurred when unauthorized persons entered the cave during off-hours.
I would like to comment on the Draft General Management Plan/Environmental Impact Statement for Carlsbad Cavern National Park.

Alternative 2, the "proposed plan," impresses me as a generally good and progressive outline for future management of the Park. However, there are two points which cause me some concern.

1. Under "Lechuguilla Cave," p. 110, it states that "the Park Service would prioritize Lechuguilla Cave research needs..." The Park has suspended exploration/survey in the cave for 1996, while not suspending research of other types. Exploration is mentioned as an expected use of the Park caves at several points in the Plan, but research (presumably seen as separate from exploration) is emphasized considerably more. In light of this, does "prioritization needed" formally mean intention to downgrade exploration with respect to research? I hope not, because exploration is the most fundamental basis for research, and basic information about the cave's extent and features is more necessary than ever, if the management is to be well planned. I would like to see more explicit recognition of the importance of exploration, an commitment to continue it, in the document.

2. On p. 118, it is further said that "an increase in cave resources management and staff would enable NPS staff to accompany most parties entering Lechuguilla Cave." But, as we have seen in recent months, the Park Service cannot even be assured of funding to do its most basic operations, let alone such secondary ones as accompanying Lechuguilla teams. If this provision is made policy, but the staffing does not materialize, will the policy be waived, or will work in the cave be reduced to the level of trips that can be assured, with preference to "prioritized research? I am in favor of Park staff getting as much experience in the cave as possible, but would prefer not to see their presence on trips made an official requirement, if this could result in restraint of exploration when they are not available.

3. On p. 41, under "Other Caves," it is proposed to study the feasibility of developing visitor access to Ogle Cave via completing the historic guano mining tunnel. It seems to me obvious, with no formal study needed, that such development would entail considerable impact on the cave and its surroundings. This is out of character with the general tone of the rest of Alternative J, which otherwise emphasizes resource protection and restoration of more natural conditions. I suggest that this development be dropped from the Plan.

Yours,

Donald G. Davis
Don Davis, National Speleological Society; Lechuguilla Exploration & Research Network

The text on page 40 of the draft document was intended to apply specifically to research teams, which are not always knowledgeable about the cave and its susceptibility to impacts, or familiar with working in a cave environment like Lechuguilla. An NPS cave specialist usually would not need to accompany an experienced exploration/mapping team, and appropriate practices could be fostered by education and trust. Therefore the text has been revised to state that a cave specialist could accompany parties entering the cave if deemed necessary. The Park Service reserves the right to accompany any party that enters a cave to ensure that appropriate practices are being followed.

Ogle Cave could provide visitors with another opportunity to enjoy the park's special resources. Before this action was taken, a need assessment would be conducted to determine if visitors desire the type of cave experience that could be offered at Ogle Cave and to look at the cost effectiveness of providing improved visitor access. If necessary, a subsequent study would assess the feasibility and impacts of developing visitor access to Ogle Cave. Note that alternative 2 categorizes these studies as phase III actions, which would be taken in 10 to 15 years. Visitor access would only be provided if it is determined to be feasible and if no significant impacts to the cave would result.
March 24, 1996

Ms. Mikisetzke
Planning Team Leader
Carlsbad Cavern General Management Plan
National Park Service / Denver Service Center
P.O. Box 25287
Denver, CO 80225-0287

Mr. Frank J. Deckert
Superintendent, Carlsbad Caverns National Park
United States Department of the Interior
National Park Service
3225 National Park Highway
Carlsbad, NM 88220


I have reviewed the above-referenced document and would like to see the Park pursue their future management plans commensurate with Alternative 2 of that document. Alternative 2 contains more rational planning for managing and monitoring resources within Carlsbad Caverns National Park in the near future than do Alternatives 1 and 3. The primary exception Ogle Cave.

The Ogle Cave feasibility study (p. 41) lists criteria (1) impact and (2) accessibility for commercialization consideration, but ignores economic considerations necessary in a Management Plan.

A) Estimated Costs: The Park experienced a downturn in visitation in 1995, and generated less revenue for the General Fund than anticipated. This is not the time to expend additional public funds on a project of doubtful financial return. The estimated cost of the Ogle Cave feasibility study ($350,000) is not a critical expenditure by itself. It is, however, a (mandated) first step in furthering monumental capitalization costs, including, but not limited to:

>Greatly enlarging the parking lot (probably paved) at the mouth of Slaughter Canyon.
>Improving the road (probably including paving the nonpaved section) from the Washington Ranch area to the parking lot to accommodate greatly increased traffic.
>Constant staff manning for the Ogle tours and the parking area (Commissioned).
>Fencing the existing entrance to prevent accidents from greatly increased foot traffic in the area.
>Lighting costs, especially electric.
>Providing emergency telephone connection to the Caverns Visitor Center from Ogle.
>Building and maintaining trails to and within the cave.
>Connecting the tunnel, and enlarging the existing tunnels (especially height) to accommodate visitors.

1. The economic considerations related to improving visitor access to Ogle Cave were not ignored. Costs for several items that you mention in your letter are included in appendix D. Others (e.g., greatly enlarging the Slaughter Canyon parking lot and improving the road) may not be necessary, even if the Ogle Cave action was implemented. However, specific details and costs would not be decided until the action (and mitigating measures to reduce impacts) were considered in more detail in future studies.
The initial capital costs of such a commercialization concept would be astronomical, especially when related to the anticipated revenue increases to be derived. Implementation of the study without regard to the economic impact to the Park System and the public is not an viable management practice. All rationale, not just some, should be considered in future planning for the Park. Do not think that the costs to provide commercial tours to Slaughter Canyon Cave would be representative of the costs to commercialize Ogle. They are as different as night and day.

B) Estimated Revenues: The millions spent in capital outlay to provide commercial access to Ogle would probably never be recovered. It would make the cost to tour the cave prohibitive. The fees collected for a secondary cave visit at Carlsbad Caverns National Park would probably not even sustain the additional personnel, maintenance and management costs on a day-to-day basis.

C) The observation on Carlsbad Cavern's carrying capacity (P. 49-50) is missing an important consideration in relation to the commercialization of Ogle. The visitation to Carlsbad Cavern will see very little if any decrease if Ogle Cave is commercialized. Carlsbad Cavern is a world-famous, world class cavern. Ogle is not. Tourism from outside the Carlsbad area exists because of Carlsbad Cavern itself, and very few such visitors would be satisfied with a visit to Ogle Cave without also visiting Carlsbad Cavern. Commercializing Ogle will not assist in the control of the carrying capacity of Carlsbad Cavern.

The issue of commercializing Ogle Cave deserves its own Management Plan / Environmental Impact Statement. In Alternative 2, the first paragraph on page 41 (referring to the Ogle Cave feasibility study) ought to be reworded to allow for the feasibility study, not to mandate it. It would permit the acceptance of the best alternative without requiring an poorly-thought out portion to be implemented.

Thank you for the opportunity to comment on the Draft General Management Plan / Environmental Impact Statement for Carlsbad Caverns National Park. Please keep me on the mailing list for future distributions of Park planning documents.

Sincerely yours,

Jim Dougall
NSS 7602L
Treasurer, Southwestern Region of the NSS
January 30, 1996

Planning Team Leader
Carlsbad Caverns General Management Plan
National Park Service/Denver Service Center
P.O. Box 25287-0287

Dear Sir,

Because of our research and practical experience with controlling lint accumulations in caves, we have contributed to the development of the General Management Plan currently being considered from its earlier drafts. We have been pleased and impressed by the thoughtful development of this process, and are also pleased to submit our thoughts on this most recent draft.

We endorse the acceptance of alternative two with its emphasis on appropriate research before taking any acts that might have unintended impacts on park resources. The continuing question of appropriate trail surfacing material is an excellent example of the wisdom of this process.

There has been a long-standing concern that the hydrocarbon base of the existing trail was inappropriate and likely contaminating the cave. The usual preference has been to replace the asphalt with a portland cement based concrete. Concrete was felt to be more compatible because of its chemical similarity to limestone. Recent, but limited, information indicated that this intuitive preference may be exactly wrong.

Information we forwarded to the Park, acknowledge in the current draft, indicated that asphalt may be stable and benign. Since then, we have contacted industry authorities and other researchers on the stability of portland cement based products in a cave environment. This was prompted by persistent reports from the Caves of Sonora than the concrete trail surfaces and bridges were "dissolving". There have also been reports that the relatively new concrete trail at Wind Cave has developed "drill holes" under dripping formations.

It seems that water, and even air, that is rich in carbon dioxide (which is especially the case in caves) will dissolve portland cement products. Carbon dioxide is recognized to be one of the main causes of deterioration of highway and bridge structures. That such structures are routinely surfaced with asphalt or other sealants is, in part, a control mechanism for
this effect. Moreover, the run-off from the reaction of carbon dioxide laden water with portland cement is probably high in calcium hydroxide and calcium oxide, is strongly alkaline and probably poisonous to the biota. One respected cave researcher describes the net effect as "...rather like dumping spent carbide in the cave." (John McLean, 11/26/95, personal communication).

We are not qualified to make a judgment on appropriate trail surfacing material, but do have informed opinions on trail design that will facilitate custodial lint control. We feel that the NPS funded lint control research we published in 1994 probably contributed useful insights on the dynamics of lint deposition and spread in caves. We also suggested a number of potentially useful strategies for limiting lint. What is needed now is in-cave field tests of control techniques ranging from custodial care alternatives to electrostatic collectors, which would include trail construction design. It might be worth mentioning that a cave trail design was developed at Mammoth Cave using recycled plastic "lumber". Lack of funding prevented the actual construction of a test section.

We do not agree with the assertion in the draft plan (p. 140) that high pressure water washing techniques are inappropriate for use in the cave. Such equipment is used extensively in privately managed show caves. We have seen it demonstrated to clean lint off of very delicate helicites. We have also used the equipment ourselves. Appropriate equipment used with care can accomplish a range of cleaning tasks. Such equipment accomplishes its cleaning tasks with such efficiency of water use that removal of waste water from the cave might be a plausible option. Again, this is something we would like to see tested.

In closing, we would like to emphasize our conviction that the visitor trail is the focused edge of the greatest human cave impact—over half a million visitors a year. All aspects of trail design should be viewed in an integrated way. The trail design influences not just lint and pollution, but also such important matters as safety and security. It is to be hoped that any research will address the many ways it impacts the resource and visitor impact.

We sincerely appreciate participating in this plan review.

Bill Yett
COMMENTS

To: Carlsbad Caverns National Park
From: David M. Jones
Subject: Comments on the proposed management plan for Carlsbad Caverns National Park

The following remarks apply to the draft management plan for Carlsbad Caverns National Park which, although requested, I unfortunately never received. However, my brief initial review of the plan, and subsequent discussions with others, provides me with enough information to make the following observations.

First, some philosophical comments. Carlsbad Caverns Natl. Park, just like any other park, faces the dilemma of managing for both resource "use" and resource "preservation". By definition a national park provides for at least a minimal amount of resource "use", as evidenced by the visitor's trail through Carlsbad Caverns. Slaughter Canyon cave is also "used" as a resource in a similar manner. Based on a review of the new management plan it appears that Carlsbad Caverns Natl. Park believes that it might be justified in developing Ogle Cave for future visitor "use".

Based on these decisions, or proposals, it appears obvious that as a society we acknowledge that the managed "use" of caves for "educational" purposes is a valid function for the Park Service to be engaged in. I have no argument with this. After all, if these caves were closed and unknown we would all be much poorer in terms of our life experiences. However, at the same time it is obvious that <99% of this use is not for "scientific" purposes but instead is driven by simple curiosity, the foundation for any "higher" learning.

While this management style seems to be a given for Carlsbad and Slaughter Canyon caves (and now potentially Ogle Cave), the opposite appears to be true for Lechuquilla Cave. The proposed management plan hardly mentions any intended "use" for Lechuquilla Cave other than for "scientific" study. Exploration and survey, the sole basis for knowledge of the very existence of Lechuquilla, is barely mentioned in the plan and there only as a footnote to a fabulous "scientific" guiding these. The Park's intended management of exploration and survey needs to be clearly spelled out in any management plan.

One of my greatest concerns about the management of Lechuquilla is the degree to which "science" permeates the discussion. As a geologist with 19 years professional experience and degrees from two prominent universities I feel reasonably well qualified to comment on these matters. Scientifically, Lechuquilla is most precious for its length, mode of formation, the site and abundance of its secondary carbonate and sulfate mineralogy, and, perhaps, because of its microbiology. (I say perhaps with regard to the latter because microbiology is like the study of insects, new species being found anywhere one looks.) While each study in Lechuquilla may seem of primary importance to the

RESPONSES

1. The wording under alternative 2 for Lechuquilla Cave with regard to exploration/mapping has been revised to state that the Park Service would prioritize Lechuquilla Cave research and exploration/mapping needs, and that research and exploration/mapping teams would have to meet NPS guidelines. Research and exploration/mapping proposals would need to be compatible with NPS management needs and priorities.
COMMENTS

scientists involved, it is not that clear that Lechuquilla is unique in anything other than some new and large speleothems themselves simply polymorphs of the most common of minerals. This is not to say that these things are not of exceptional beauty, value, and worthy of scientific study. They are. (And this is the main reason I love to visit the cave.) But the Park Service needs to put these studies in a better perspective with regard to the larger body of scientific knowledge. Furthermore, the Park should recognize that if Lechuquilla was a dry, ugly, miserable cave the number of applications for permits for scientific study would dry up like wet rock after a summer rainstorm. In short, the science studies in Lechuquilla are based at least as much on the fact that Lechuquilla is a spectacularly beautiful cave as they are on truly attempting to push back significant barriers to scientific knowledge.

(I is common knowledge amongst Lechuquilla cavers that the "best" way to see most of the cave is to go on science trips. Far more sightseeing, touring, and photographing is done on these trips as compared with survey trips.) These motivations are not "bad" but, most importantly, they are not fundamentally any different from those which motivate survey and exploration trips. Speaking as a scientist, it confounds me that the park service does not appear to appreciate that exploration and survey is the most fundamental and important of all scientific endeavors. (It is common knowledge amongst Lechuquilla cavers that the "best" way to see most of the cave is to go on science trips. Far more sightseeing, touring, and photographing is done on these trips as compared with survey trips.) These motivations are not "bad" but, most importantly, they are not fundamentally any different from those which motivate survey and exploration trips. Speaking as a scientist, it confounds me that the park service does not appear to appreciate that exploration and survey is the most fundamental and important of all scientific endeavors. Without the basic information provided by these trips nothing further can be accomplished or understood. You can't study what you are not aware of. I hope that the park will make a commitment to continued survey and exploration into its management plan.

Finally, I would like to comment on the Park's perception of impact on Lechuquilla Cave. First, I find it highly incongruous that trips have been reduced into Lechuquilla, ostensibly for purposes of reducing impact, while at the same time the Park proposes to blast open Ogle Cave. Wherein lies the logic? While I am not strongly against the opening of Ogle I am puzzled at the inconsistency in management standards indicated by such a recommendation.

Second, much of the impact which has been attributed to survey and exploration trips into Lechuquilla has a) NOT been shown to be attributable to such trips (i.e. theft of speleothems, b) has, at least in part, been directly attributable to visitors who were added to exploration trips by the park, c) has been caused by newcomers who were not in shape and/or healthy. Furthermore, heavy impacts to the cave by non-exploration and survey trips have been effectively discounted by their continued access to cave. A few examples of science trips causing heavy impact include:

1. The introduction of a glass slide into the dilithium pool selenite crystals;
2. The irreversible destruction, and permanent removal?!?, of bat skeletons;
3. The trip to Hudson Bay by entirely unqualified and physically unfit NASA scientists;
4. Repeated "bog" trips by science personnel to any and all corners of the cave in numbers far in excess of those needed to conduct or retrieve readings.

These impacts are of equal or, in my opinion, greater magnitude than those conducted by primary exploration trips. While I know that impacts are inevitable there is absolutely no reason to treat these impacts as qualitatively any different from those of other trips.

I believe that all parties with valid purposes should be allowed controlled access to Lechuquilla Cave. This includes quality science projects as well as exploration and survey trips. I am not anti-science (indeed, I am the opposite), but I am against using the "cover" of science to justify the exclusion of exploration and survey. The park seems to be drifting in this direction and I wish to express my deepest conviction that this is based, in

RESPONSES

2. The National Park Service does view Ogle and Lechuguilla Caves somewhat differently, although it is committed to preserving resources in both caves. Improving access to Ogle Cave would be continuing this cave's long history of human use and visitation, although further studies are proposed to determine if there is a need to open Ogle Cave to the public and whether it would be feasible. Human use of Lechuguilla Cave, on the other hand, spans one decade, and has been limited to exploration, mapping, documentation, and research. The measures outlined in alternative 2 are intended to help keep Lechuguilla Cave as pristine as possible at the same time that more is learned about the cave's extent and its special resources.

3. There was no intent to imply that exploration and mapping trips into Lechuguilla Cave result in more damage to the cave than research trips. All parties entering the cave must be aware of techniques and procedures to minimize damage to cave resources. To help minimize impacts by unknowledgeable parties, an NPS cave specialist could accompany parties entering the cave to ensure that appropriate practices are being followed.
part, on a misperception of the relative roles and importance of each. Again, I state this as a person who conducts scientific field evaluations as part of my professional career.

Thank you for your dedicated management and protection of the park resources, and please take these comments into serious consideration during the re-draft of your management plan.

Sincerely,

David M. Jones
1. Human waste disposal is a problem. One study has already shown that human urine can significantly affect cave microbial communities. Studies considering alternative ways of disposing of human urine in the cave to prevent future contamination are underway. However, urine filtration is proving to be problematic because urea molecules (which are of primary concern) are so small that backpacking-type filters do not effectively remove them. If a solution to this problem is developed, filtration of urine would immediately become a requirement in Lechuguilla Cave.

2. Due to resource concerns, the park placed a moratorium on survey expeditions in Lechuguilla Cave in 1996. Expedition size will be considered once expeditions resume; however, as you suggest, experience has shown that smaller expeditions have less impact on the cave and are more productive. Large expeditions (more than 50 persons) have not been permitted since 1991.

3. An NPS cave specialist usually would not need to accompany an experienced exploration/mapping team, and appropriate practices could be fostered by education and trust. Therefore the text has been revised to state that a cave specialist could accompany parties entering the cave if deemed necessary. The Park Service reserves the right to accompany any party that enters a cave to ensure that appropriate practices are being followed.

4. The concerns regarding the Lechuguilla Cave airlock are related to safety, stabilizing the nearby slopes, and protecting the cave from vandalism. The park does not expect that addressing these concerns will lead to more requests to enter the cave. The park plans to conduct a study/environmental assessment to evaluate possible improvements to the present airlock/culvert system. The study would likely evaluate ways to protect the cave from unauthorized entry, stabilize the slopes above and below the culvert, reduce rapid airflow that can present a safety hazard and alter cave air conditions, and possibly address the question of whether the existing culvert is the best way of accessing the cave.
5. Only a few minor trail realignments in known problem areas would be considered. Before the decision was made to realign any trail sections, the impacts of such an action would be carefully considered.

6. As you point out, asphalt appears to stop losing hydrocarbons about two years after it has been applied. Alternative 2 has been revised to state that old asphalt that is exposed to air would be removed or sealed. A study is proposed to investigate the effects of the existing epoxy resin/emery chip surface on the cave and to identify alternative trail surface materials that would provide traction but not impact the cavern.

7. The estimated cost for the maintenance building includes offices, a meeting room, restrooms, and specialized equipment used to build and repair park equipment. Class C cost estimates are conceptual and include costs for construction supervision and contingencies related to unanticipated conditions or situations. They are used to compare relative costs of alternatives. More detailed cost estimates would be made later, in conjunction with planning and design of such a facility.

8. The ongoing infiltration study will provide more information about water routes and contaminant infiltration into the cavern. Once this information is in hand, an effective system for treating (or treating and diverting) parking lot runoff so that contaminants do not enter the cave can be designed. This measure is called for in the proposed action.

9. Electronic surveillance has not been adequate in the past to prevent speleothem breakage due to the length of self-guided trails in the cavern and the limited NPS staff available to monitor the problem. Visitor access to the most vulnerable portions of the cavern (the Green Lake Room, King's Palace, Queen's Chamber, and Papoose Room) has recently been converted to guided tours, and the proposed action calls for increased NPS staff to be stationed along trails in particularly vulnerable areas. The plan also calls for additional protective measures (such as guardrails, trail realignment, improved interpretive messages, etc.) to reduce damage to cavern formations.
10. The feasibility study and impact analysis would evaluate and recommend protective measures for Ogle Cave in more detail, along with considering the two measures that you mention. An airlock would probably be needed, as you suggest, to prevent unnatural humidity, pressure, and other changes in the cave's atmosphere. This element was included in the construction cost estimates on page 194 of the draft document.

11. The NPS costs of improving visitor access to Ogle Cave could probably be reduced through cost sharing or volunteer work.

12. In the past the park has been able to use donated or surplus materials for bat-friendly gates, and it has been able to install the gates using cave resource funds. The park anticipates gating relatively few additional caves, all of which have small openings. Funding is not anticipated to be a problem.
COMMENTS

**Comments on**

**CARLSBAD CAVERNS NATIONAL PARK GENERAL MANAGEMENT PLAN**

1. Recast the plan in the context of likely national political and economic priorities that will impinge on the feasibility of implementing the preferred alternative.

   The proposed plan seems to have been drafted without consideration of the national political tenor of balanced budget and less government, and its implications for continued belt-tightening for all federal agencies. In this climate, the addition of 51 full-time staff members seems unrealistic. A meaningful plan should explore implications of this national atmosphere for operations of the Carlsbad Caverns National Park.

2. Recast the plan in the context of the recent National Park Service reorganization.

   NPS reorganization reduces regional and national bureaucratic support for the Caverns staff, as well as places new demands on local staff. The Caverns superintendent, for instance, has been given additional responsibilities for assistance to other parks in the cluster. Shifting of regional staff—both in terms of locations and duties—reduces management and technical support to the Caverns. A meaningful plan should address projected impact of the new NPS organizational structure on the ability of the Carlsbad staff to meet management objectives proposed in the plan.

3. Strengthen the socioeconomic environment section of the proposed plan.

   The proposed plan implies that the only socioeconomic impact of the park on the community of Carlsbad is that of its park budget and staffing (p. 121). Even in this arena, however, the plan makes no attempt to determine true economic impact, i.e. direct dollar expenditures for payroll, construction, operation, secondary impacts of dollars spent in Carlsbad; or, more importantly, projected impacts of alternative NPS strategies.

   The park has a tremendous psychic and social influence on the community of Carlsbad—from involvement of park staff in community activities, to extensive community volunteerism at the park, to a community sense of pride in, identity with and concern for the park and its future. While many in the community see the caverns primarily in economic terms, many of us recognize the symbolic and psychic identity with the park as equally important to our community. The plan should recognize the socioeconomic symbioses of NPS and the city of Carlsbad, and build management goals which utilize that symbiosis for our mutual benefit.

4. Develop management goals to foster a continuing dialog and working relationship between the Caverns management and the community of Carlsbad.

   The proposed plan alludes to the need for cooperative efforts between NPS staff and the Carlsbad community (primarily in terms of the need for pre-information to visitors before they arrive at the park [p. 148]).

RESPONSES

1. In preparing the proposed general management plan for Carlsbad Caverns National Park, the planning team looked at current park obligations and needs, as well as future needs, recognizing that budgets are tight today and that there are shortfalls in the park's current operational programs. Political and economic forces could affect implementation of the plan, but it is not possible to predict how these forces would change over the life of the plan. General management plans do not guarantee funding, but rather provide the rationale and priorities for future funding requests. Most of the management actions in alternative 2 are necessary to achieve the NPS mission and the purposes for which Carlsbad Caverns National Park was established. Because funds would not be available to implement all of the proposed management actions in the plan at once, actions were prioritized in three phases (see page 192 of the draft document). Additional options were identified if funding and staffing for some elements were unavailable (see page 63).

2. The Park Service's reorganization should not adversely affect the park staff's ability to implement the proposed plan. Operational matters are to be handled by the park staff as in the past. National program centers are still available to help plan, design, and build facilities. The Southwest Systems Support Office is also available to provide support to the park if needed. The goals of the reorganization are to shift resources and staff to parks, to improve the management efficiency of parks by reducing organizational overhead, and to eliminate unnecessary reviews of plans and operations.

3. Page 121 in the "Affected Environment" does not cover all present economic effects of the park. However, appendix I of the draft document discusses additional present economic benefits to the local economy, such as increased sales, additional taxes, and the number of jobs created or supported. The draft and final documents do identify the potential construction costs of the alternatives (see appendix D), and the major economic effects of the alternatives are generally assessed (see the "Socioeconomic Impacts" sections of the "Environmental Consequences" section).

   With regard to the park's psychic and social influence, the Park Service recognizes that the park and the local community do affect one another. The Park Service will continue to work with the city of Carlsbad on issues of mutual interest.
The recent successful effort by NPS, Carlsbad, and state officials to reopen the Caverns during the federal government shutdown demonstrates the mutual benefits of continuing dialog and cooperation between NPS staff and the local community. It is highly likely that enhanced partnership with the local community will further goals desired by both entities. The management plan should include such a mechanism as a formal goal. Examples of issues which might be addressed in such dialog include:

The NPS objective to enhance educational programs targeted at school groups (p. 52):
Possible partnership projects could include 1) a NPS-Carlsbad Municipal Schools project to integrate the forthcoming caverns CD-ROM into pre-visit classroom preparation, and in post-visit summary and analysis; 2) a NPS-Schools effort to develop an integrated curriculum that includes park geology, ecology, and environmental awareness, conservation, and preservation; 3) collaboration between the NPS outreach to Mexican educators and school groups with efforts by the Carlsbad Department of Development, Carlsbad Hispanic Chamber of Commerce, and Carlsbad International Good Neighbors Council efforts to strengthen business and cultural ties with Mexico.

The NPS objective to increase visitors pre-visit knowledge of the caverns (p. 14): A natural partnership would be one in which NPS worked with the Chamber of Commerce and other groups to: 1) develop an in-town visitors center with informational kiosks that clearly delineate the differences among the different tours available at the Caverns; 2) explore the feasibility of “high-tech” outreach efforts in local motels, e.g. an in-room video channel or CD-ROM access, informational kiosks located in motel lobbies, etc.

The NPS objective to explore feasibility of developing visitor access to Ogle Cave (p. 41).

4. It is NPS policy to work cooperatively with neighboring communities to address mutual concerns and interests. The park staff has worked with the community of Carlsbad in the past to resolve issues and achieve common goals, and they will continue to do so in the future. Your suggestions on educational programs and providing information to visitors will be further considered in the future.

5. No new information has come to light to prompt a reexamination of the underground lunchroom decision made in 1993. As noted on page 14 of the draft document, the Park Service decided to remove underground concessions because the purposes for which the lunchroom facility was established are no longer valid. The Park Service believes that the lunchroom facilities in the midst of the park’s prime resource are not in keeping with the NPS philosophy of protecting and highlighting the cave’s special resources and character, and the need for protection. In addition, the 1993 environmental assessment identified negative impacts associated with the lunchroom; rangers have found candy wrappers, water bottles, flashlight covers, and other trash that have come from the lunchroom in the cavern. The Park Service believes that impacts of visitors in the cavern can be more effectively reduced by removing the concession facilities, increasing efforts to educate visitors regarding impacts, and increasing NPS roving patrols, than by restricting eating to one area of the cave.

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1. The Park Service considers research and exploration/mapping to be two separate activities, although they may be linked. In the case of Carlsbad Cavern, research refers to scientific studies that are conducted to increase knowledge of the cavern or to improve management. The wording under alternative 2 for Lechuguilla Cave with regard to exploration/mapping has been revised to state that the Park Service would prioritize Lechuguilla Cave research and exploration/mapping needs, and that research and exploration/mapping teams would have to meet NPS guidelines. Research and exploration/mapping proposals would need to be compatible with NPS management needs and priorities.
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<th>COMMENTS</th>
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<td>I would recommend that the wording in ALTERNATIVE 2 - PROPOSED ACTION, Page 40 LECHUGUILLA CAVE, be clarified to indicate what activities are included under the umbrella of &quot;research.&quot; The term &quot;research&quot; should be defined. If, in fact, the activities not mentioned are not included in &quot;research&quot; then I would recommend that they be included. If this information is included in the 1995 Cave Management Plan, then this document should be referenced.</td>
<td>2. The text on page 40 of the draft document was intended to apply specifically to research teams, which are not always knowledgeable about the cave and its susceptibility to impacts, or familiar with working in a cave environment like Lechuguilla. An NPS cave specialist usually would not need to accompany an experienced exploration/mapping team, and appropriate practices could be fostered by education and trust. Therefore the text has been revised to state that a cave specialist could accompany parties entering the cave if deemed necessary. The Park Service reserves the right to accompany any party that enters a cave to ensure that appropriate practices are being followed.</td>
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<td>In addition, I am concerned with the statement &quot;A cave specialist would accompany most parties entering the cave...&quot; I would argue that this is not necessary and that the &quot;appropriate practices&quot; mentioned can be fostered by a spirit of education and trust rather than direct supervision by a &quot;cave specialist,&quot; whose time and effort might best be spent elsewhere.</td>
<td>3. Alternative 2 sufficiently addresses the exploration of caves in the park. As you point out, continued exploration is needed to fulfill the requirements of the Federal Cave Resources Protection Act, and the efforts of the many individuals who have helped in this effort are greatly appreciated. But there is a need to balance exploration efforts with NPS mandates to protect and preserve cave resources. Exploration work has sometimes resulted in unintentional impacts to caves in the national park. To ensure that such impacts are minimized in the future, a cautious approach is favored for exploring caves.</td>
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<td>Finally I would recommend that more emphasis be given to the exploration of caves within Carlsbad Caverns National Park in ALTERNATIVE 2 - PROPOSED ACTION. The statements on Page 7, under Primary Interpretive Themes regarding the &quot;recent discovery of the extent of Lechuguilla Cave, along with continuing discoveries in other caves...&quot; and the statement in the summary of the 1995 Cave Management Plan regarding the &quot;continuing exploration and survey&quot; of Lechuguilla Cave should be echoed and elaborated on in ALTERNATIVE 2 - PROPOSED ACTION.</td>
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<td>Exploration of the Park's caves should be encouraged and supported in the management plan. In order to comply with the Federal Cave Resources Protection Act's requirements as outlined on Page 21, the Park needs to determine the extent of the cave resources within its boundaries. This can only be accomplished by continued exploration. Lechuguilla Cave has become the &quot;deepest and third longest limestone cave in the United States&quot; through the EXPLORATION efforts of hundreds of dedicated individuals.</td>
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<td>I would encourage this PLAN/STATEMENT to keep the &quot;SPIRIT OF EXPLORATION ALIVE&quot; in Carlsbad Caverns National Park.</td>
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Sincerely,

Robert Montgomery
I'm writing specifically in regards to Lechuguilla Cave and how its future management will be impacted by the general management plan.

I have been an active explorer in Lechuguilla Cave since August of 1987. As such, I have seen the impact of exploration and scientific research on the cave environment. Entering any pristine cave environment will always have an impact, but I do believe that the extent of the impact can be limited by careful caving practices and by management based on an understanding of the environment of the cave. I support the adoption of the proposed action: Alternative 2.

Lechuguilla Cave exceeded anything expected when exploration first began; in terms of both size and scientific significance. And it continues to astound, as more is learned about the cave and about its potential contributions to the knowledge of caves, cave protection, and to the world in general. As such, it is important that valid scientific research be conducted within Lechuguilla Cave. While it may be frustrating as an explorer to have areas within Lechuguilla Cave closed due to a research project, it would be extremely foolish to deny exploration on another level (i.e. scientific research), that could benefit cave protection and/or benefit the world in other ways. It is important that research proposals which would be compatible with NPS research management needs and priorities be supported, as indicated in Alternative 2.

It is imperative that exploration and research activities be conducted by appropriately cave qualified individuals who are willing to follow accepted cave conservation activities and guidelines as set forth by the NPS. It is unfortunate that there are explorers and researchers who lack the skills and/or commitment to protect Lechuguilla Cave as best possible; as such, it is vital
that the NPS have a way to monitor activities within the Cave to ensure appropriate practices are followed, resulting in reduced damage to Lechuguilla Cave. Providing increased staffing and funding for the Office of Cave Resources would provide opportunities for a Cave Specialist to accompany various parties within Lechuguilla Cave to ensure accepted caving practices and NPS guidelines are followed. Alternative 2 would best support this management plan without severely restricting access to the cave. Increased staffing and funding would give the Cave Specialist greater discretion as to which teams to monitor and in choosing when to monitor, with the goal of reducing damage to the cave.

Equally important to the protection of Lechuguilla Cave is to provide for the funding and staffing resources to fully implement the existing Cave Management Plan as supported by Alternative 2.

In general, Alternative 2: the proposed action, best suits the goals of exploration and research within Lechuguilla Cave without severely restricting access to the cave, while providing for increased protection of the cave resource itself.

Sincerely,

[Signature]

Patricia E. Seiser
## COMMENTS

**George Veni & Associates**  
Hydrogeologists and Biologists  
Environmental Management Consulting  
Cave and Karst Specialists  

Planning Team Leader  
Carlsbad Caverns General Management Plan  
National Park Service  
Denver Service Center  
P.O. Box 25287  
Denver, CO 80225-0287  


Dear Team Leader:

I have reviewed the draft General Management Plan/Environmental Impact Statement (EIS) for Carlsbad Caverns National Park, New Mexico and offer the following comments and suggestions. The numbered comments below address specific items in the EIS, and are followed by my overall recommendation for which management alternative to implement.

1. On page 16, the Subsurface Natural Resources Management Plan does not include a study or survey of the cave's fauna. Such a study is also missing from the recommended research discussed for Alternative 2 on page 40. To my knowledge, Diana Northup has studied cave crickets in Carlsbad Caverns and its bat population has received sporadic attention from biologists, but there has been no comprehensive study of the cave's fauna. The EIS repeatedly discusses the need to protect the cave's fauna and the potential impacts of lint on the fauna, yet such efforts and impacts cannot be accurately determined without a full faunal assessment.

2. In Alternatives 2 and 3, various monitoring of Carlsbad Caverns is proposed, such as for speleothem damage and lint accumulation. However, no such monitoring is proposed for Slaughter Canyon Cave. While the traffic through that cave is far less than at Carlsbad, it is far greater than in undeveloped caves. I believe that monitoring of Slaughter Canyon Cave, to include impacts on the cave's fauna, is warranted considering the number of regular tours led there. Results from such monitoring would not only help to better manage and protect that cave, but could reflect if such study is warranted at the park's undeveloped caves and how often those caves should be examined.

## RESPONSES

1. It is not clear from your comment if you are referring just to Carlsbad Cavern or to the park's caves in general. Studies have been undertaken in the past to survey and inventory the fauna of Carlsbad's caves. For example, in 1992 a biological inventory of Lechuguilla Cave was published. Additional studies are now being conducted on that cave's microbial community. However, no comprehensive study of Carlsbad Cavern's fauna has been completed, and there is a need for additional fauna studies in all park caves. Alternative 2 has been modified to call for these studies.

2. Your suggestion that the impacts of visitors on Slaughter Canyon Cave's fauna should be monitored has been added to alternatives 2 and 3. However, there is no evidence that speleothem damage is occurring in this cave; all visitors are restricted to ranger-led walks, which has largely prevented this potential impact. Lint accumulation may be occurring, but this impact is minor when compared to the damage caused by guano mining in the cave in the early part of the 20th century.
My overall recommendation is to implement Alternative 2 for the following reasons:

- The amount of surface development is very limited in area.
- Current facilities have been in place for many years and probably do not impact most of the cave.
- If impacts were severe, they would have been strongly and definitely stated in the EIS (the statement on page 64 indicates some uncertainty).
- Assuming the impacts are moderate or only threatening, time probably exists for research, and for the successful implementation of preventive and remediation measures.
- Long term proper management of Carlsbad Caverns National Park requires a detailed understanding of its resources, which only Alternative 2 provides.

There would be several drawbacks to curbing the road as you suggest. Building curbs with breaks would be more expensive than the measures called for under the proposed action. There could be resource problems near the breaks if large quantities of water and gravel flowed out during storms. Road maintenance would be more difficult if crews had to lift displaced gravel over the curbs and back onto the road surface. Finally, curbs are typically found on high standard, paved surfaces and in urban areas. From a visual standpoint, curbs would alter the visitor experience on the drive and thus are not considered to be appropriate.
The primary threat to cave resources discussed in the EIS is the storage of hazardous materials on the surface. If Alternative 2 is enacted, these materials could be conveniently stored off the escarpment (such as by renting storage space in nearby Whites City) or containment structures could be installed or built and emergency response plans prepared in case of spills of materials on the escarpment. These options should be relatively inexpensive yet adequate to protect the Park's resources while meeting the NPS' maintenance/service needs until research and recommendations from Alternative 2 are complete.

If my above premise is wrong and the data suggest that Carlsbad Caverns National Park will suffer significantly harmful impacts before the completion of studies under Alternative 2, then I strongly encourage the NPS to implement Alternative 3, and still conduct the Alternative 2 research as soon as financing allows.

I hope these comments are helpful. If you have any further questions, feel free to contact me.

Sincerely,

George Veni, Ph.D.
Hydrogeologist
Dear Planning Team Leader:

I am writing in regards to the Draft General Management Plan Environmental Impact Statement for Carlsbad Caverns National Park. I understand that the January deadline was extended until the end of February due to the government shutdowns during the winter.

I am a Carlsbad resident and was born in this community. I have long been involved with the Carlsbad Caverns National Park and worked for two summers as a seasonal at CACA. I am active in numerous environmental groups and do volunteer research at Carlsbad Caverns National Park. I recognize the importance of Carlsbad Caverns National Park in protecting a small portion of the Chihuahuan Desert and feel that other Federal and State agencies could learn from the NPS in regards to biodiversity protection.

I appreciate all the hard work that was done to put this book together and found it interesting reading. I favor a blend of Alternatives 2 and 3 and lean toward Alternative 3 with a few exceptions. I think that above all else, the NPS should do everything humanly possible to protect the natural resources found in the park and to ensure that they are not threatened by activities in nearby areas.

I have some comments regarding specific items mentioned in the report. Overall I was disappointed to see an emphasis in many areas on cultural/historical aspects to what I felt was the exclusion of the natural elements in the park. I recognize that my personal bias is toward the natural elements found in the park but I have to go back to why the park was established. It was to protect the natural elements found there, the cave and the natural areas on the surface. I am not saying that interpreting the historical aspect isn't important. It certainly is important, especially as it relates to the early days at Carlsbad Caverns. But there were far too many references about interpreting the historical aspects of Rattlesnake Springs for example.

True, Rattlesnake Springs did play a part in the European settlement of this area. But was it really that historically significant? Do we need to illustrate European settlement

With regard to Rattlesnake Springs, this area is recognized as a national historic district listed on the National Register of Historic Places, and it is also special for its natural resources; several passages have been revised to emphasize this.

One of the purposes of Carlsbad Caverns National Park is to preserve and protect both natural and cultural resources associated with the Chihuahuan Desert and Capitan Reef. Alternative 2 calls only for expanding existing wayside exhibits near the Rattlesnake Springs picnic area to interpret the natural and historical resources of the area (see page 52 of the draft). This action would not degrade the area's natural elements. Appendix C of the draft and final documents states that the area would be managed as a cultural landscape. This management strategy would allow the Park Service to maintain and preserve historic features while enhancing biotic resources. However, no action would be taken until studies on the area's resources had been completed.
everywhere? It is especially critical that we remember the natural elements at Rattlesnake Springs when we undertake any new ideas regarding management. Rattlesnake Springs is largely riparian habitat which is rare enough here in the Chihuahuan Desert. The area is in fairly good shape and provides habitat for numerous endangered/threatened species. Why do anything to upset this critical balance there in order to spend more time and money talking about European settlement?

I think except for the picnic area, housing area and facilities necessary to provide water for Carlsbad Caverns NP, the entire Rattlesnake Springs facility should be allowed to revert to as natural a state as possible. I have visited Rattlesnake Springs over 300 times and I haven't had anyone ask me about anything dealing with the history of the site. But I get numerous questions, phone calls and letters from people want to know about the birds, or plants or some other aspect of the springs area.

I have other specific comments related to portions of the text of the document.

Page 2: I am concerned by the continued encroachment of gravel and dust from the loop road into adjacent areas and am glad that this is recognized. Something else that should be considered is the reduced rates of photosynthetic activity of nearby plants that are covered by this dust. Under nonnative animals I am also glad to see a statement in favor of removing AOUQad and replacing them with the native Mountain Sheep.

Page 13: Under Visitor Center section perhaps it would be a good idea to construct a low cost, low maintenance trail to the edge of the escarpment so that people can get a better view. Perhaps an interpretive sign would be good to place at the end of the trail. But nothing expensive and a very nature-friendly trail should be what is developed. A narrow trail using only local materials would be more than enough.

Page 14: Based on what we know about the hantavirus, I think the word "probably" would be a better word to use instead of "possibly." Later in the next paragraph it talks about rangers having to stand out in the sun at the cave entrance. A shed was once there and it really wasn't very det intrusive but was probably removed because it wasn't "natural." A large fence now occupies much of the entrance area that detracts much more than a shed ever did. Also on that same page I fully support the idea of removing underground concessionaire activities.

2. The draft document notes on page 131 that the migration of road aggregate on the Walnut Canyon desert drive would cover or damage roadside vegetation. This would include reduced rates of photosynthetic activity, as you point out.

3. Alternative 2 calls for the development of a self-guided geologic interpretive trail and overlook near the visitor center, similar to what you are suggesting (see pages 52 and 55).

4. The text has been revised to state that the existing Putman cabin possibly constitutes a health threat from hantavirus.
Page 15: I also fully support extending the park boundaries so that the entire escarpment is protected. I realize this is not a popular idea but I think it makes management sense to have the entire escarpment in the National Park system such as was proposed by former Congressman Andrews. In the last paragraph on that page I disagree with the statement that "... resources are now being adequately managed." I don't feel this is the fault of the current park administration or staff but that it is more the fault of Congress and the NPS for not providing adequate people to do an adequate job. Carlsbad Caverns National Park, like so many other national parks, doesn't even have a complete listing of all the vertebrates known from the park much less lesser elements such as invertebrates and plants. How can we adequately protect what is there when we don't know what is there?

Page 17: Have the introduced trees at Rattlesnake Springs been there long enough to qualify for special protection under the provisions of the historic district? It bothers me to see us protecting nonnative species to the exclusion of native species, especially in an area where the historic aspects are of marginal value.

An error occurs in the section on Cave Swallows at the bottom of the page. The park does not represent the western limits of the birds range as it nests in the Guadalupe Mountains to the west and in isolated pockets in the El Paso-Las Cruces areas.

I am bothered by the statement that "... little else is known about the ecology of these birds." It apparently won't do any good to recount here the long term Cave Swallow research project that I have been doing at Carlsbad Caverns National Park since 1980. Thousands of birds banded, many thousands of volunteer hours, and over 500 volunteers. A dozen or so scientific papers have come from this study including a book specifically just on this species. Throughout the entire report that one statement disturbed me the most. Either the park service doesn't really know the significance of this project or someone must feel that for the research to have any validity, it can't be done by volunteers. After 16 years of volunteering my time and time of hundreds of other people, I am considerably confused when this document says that you propose "... a research study to gain information necessary to properly manage cave swallow populations." That is what I have been trying to do, all at my own expense for more than 1 1/2 decades. I have given copies to NPS of everything that has come from this study. Other banders have told me that the Cave Swallow population at Carlsbad Cavern is the best studied, long term single colony of swallows in North America. There are other things that need to be done.
### COMMENTS

**Page 4**

20 February 1986

but a tremendous amount has already been done, all volunteer
and at no cost to the National Park Service.

I would like to discuss this specific item further at
the earliest convenience of the person who is responsible for
it. Someone needs to be made aware of what has already been
done.

**Page 18**

Where is the 10 miles of unfenced boundary located?

Later in the page mention is made of the last

Bighorn (Mountain Sheep) record from the Guadalupe. There
are photographs of a single ram in the early 1980's from the
west escarpment, an animal that apparently wandered in from
some other location.

**Page 20**

I fully support the protection and restoration of
any and all wetlands at Rattlesnake Springs.

**Page 26**

I fully support increased law enforcement in the
park. This should include not only increased
presence in the cave but also on the surface. I frequently
hear rumors about people driving the Walnut Canyon road at
night looking for snakes.

**Page 27**

I am glad to see that sensitive information
relating to locations of paleontological and
cultural sites will be guarded. I assume this protective
attitude will also extend to raptor nests, locations of
sensitive plants, etc.

**Page 28**

I fully support the authority of the superintendent
to restrict access to sacred sites as necessary.

**Page 29**

I fully support the use of Spanish as one of the
languages in which the park will reach out to
visitors.

**Page 30**

(and numerous other sites): Again, I am bothered by
the emphasis on

protecting cultural sites first and foremost at Rattlesnake
Springs. If this were truly an important site it would be a
different situation. How many times do we need to say,
Europeans settled, drove out Native Americans, they became
cowboys, raised cows for a few years, killed all the
predators and then moved on? Rattlesnake Springs is
important to the visitor as a natural area, not because they
want to see what it would have looked like if John Wayne had
settled the area.

### RESPONSES

8. The unfenced portions of the boundary are located along the western
and northwestern portions of the park in rugged country where
outside influences are not currently believed to be a threat to park
resources.

9. The text has been updated to acknowledge confirmed sightings of
bighorn sheep in the Guadalupe Mountains as recently as 1979.

10. See responses 1 and 5 above.

11. References to competition between cave swallows and bats have been
deleted.
(which I wish the park would recognize as an important and free source of data) can provide these answers. It also makes it sound like perhaps bats are preferred over swallows. In fact, there is little, if any overlap in the competition for resources or space in the cave. This concern about competition is also mentioned on page 132. Cave Swallows colonized the cave naturally the same as bats did. Their presence there is as valid as is the presence of bats.

Page 53 (and elsewhere): While it would be nice to remove the buildings from the current housing area, I am concerned about where new buildings would be constructed (certainly not Rattlesnake Springs) and the cost. The money for such a project could be used for many other better things than this.

Overall I think the document is good. I generally prefer Alternative 3 because I think it does the best job of protecting the resources of the park in a long term manner. I am bothered that there are a number of errors and discrepancies in the document that could have been avoided. While I know that it was the primary responsibility of the NPS to produce this document, I note that the Planning Team and Consultants were not limited to just NPS employees. There was even an individual from "private industry." There are others that love the park and are concerned about its future and will be here for many years yet to come. Yet their expertise, however limited in scope, was not used. I am of course, referring to numerous errors, most of which aren't pointed out in this letter due to space, relating to Cave Swallows in the park. Please! Make better use of the volunteers that want to protect the park resources as much as anyone else.

I appreciate the opportunity to comment and look forward to working with you in the future. Thank you and let me know what how I can help.

Sincerely,

Steve West
APPENDIX A: LEGISLATION

UNITED STATES CODES, TITLE 16 — CONSERVATION

SUBCHAPTER L—CARLSBAD CAVERNS NATIONAL PARK

§ 407. Establishment

The tract of land known prior to May 14, 1930, as the Carlsbad Cave National Monument, in the State of New Mexico, established and designated as a national monument under section 431 of this title, and by presidential proclamation of October 25, 1923, is declared to be a national park and dedicated as a public park for the benefit and enjoyment of the people under the name of the Carlsbad Caverns National Park, under which name the aforesaid national park shall be entitled to receive and to use all moneys heretofore or hereafter appropriated for the Carlsbad Cave National Monument.

(May 14, 1930, ch. 272, § 1, 46 Stat. 279.)

References in Text


§ 407a. Administration, protection, and development

The administration, protection, and development of said Carlsbad Caverns National Park shall be exercised under the direction of the Secretary of the Interior by the National Park Service, subject to the provisions of sections 1 and 2 to 4 of this title, and Acts supplementary thereto or amendatory thereof.

(May 14, 1930, ch. 272, § 2, 46 Stat. 279.)

Transfer of Functions

For transfer of functions of other officers, employees, and agencies of the Department of the Interior, with certain exceptions, to the Secretary of Interior, with power to delegate, see Reorg. Plan No. 3 of 1950, §§ 1, 2, eff. May 24, 1950, 15 F.R. 3174, 64 Stat. 1262, set out in the Appendix to Title 5, Government Organization and Employees.

Cross References

Transportation of employees, see section 1b of this title.
§ 407b. Applicability of Federal Power Act

The provisions of the Federal Power Act [16 U.S.C. 791a et seq.] shall not apply to or extend over the land by section 407 of this title or hereafter reserved and dedicated as the Carlsbad Caverns National Park.

(May 14, 1930, ch. 272, § 3, 46 Stat. 278.)

REFERENCES IN TEXT

The Federal Power Act, referred to in text, was in the original the "Act of June 10, 1920, known as the Federal Water Power Act," and was redesignated as the Federal Power Act by section 791a of this title. The Federal Power Act is act June 10, 1920, ch. 265, 41 Stat. 1063, as amended, and is classified generally to chapter 12 (§ 791 et seq.) of this title. For complete classification of this Act to the Code, see section 791a of this title and Tables.


§ 407d. Admission and guide fees exempt from tax

Any admission fee charged for entrance to Carlsbad Caverns and any fee charged for guide service therein shall be exempt from all taxes on admissions.

(June 22, 1936, ch. 691, § 1, 49 Stat. 1792.)

CODIFICATION

Act Sept. 20, 1941, ch. 412, title V, § 541(c), 55 Stat. 710, amended act May 9, 1935, ch. 101, § 1, 49 Stat. 207, which had been classified to this section of the Code, "by striking out that part thereof" upon which this section was based. Said act Sept. 20, 1941, however, made no mention of act June 22, 1936, which reenacted those same provisions. Such act Sept. 20, 1941, was made effective on, and applicable only with respect to the period beginning with, Oct. 1, 1941, by section 550(a) thereof.

§ 407e. Boundaries

Carlsbad Caverns National Park situated in the State of New Mexico shall consist of the following described lands:

NEW MEXICO PRINCIPAL MERIDIAN, NEW MEXICO

Township 24 south, range 23 east: section 35; section 36.

Township 24 south, range 24 east: sections 25 to 29, inclusive; sections 31 to 36, inclusive.

Township 24 south, range 25 east: south half southeast quarter section 19; south half south half section 20; south half south half section 21; southwest quarter southwest quarter section 26; sections 27 to 33, inclusive: west half section 34; northwest quarter northeast quarter section 34.

Township 25 south, range 22 east: sections 24, 25, 35, and 36.

Township 25 south, range 23 east: sections 1 to 33, inclusive; northwest quarter section 34.

Township 25 south, range 24 east: north half section 1; west half section 2; northeast quarter section 2; sections 3 to 8, inclusive; west half section 9; northeast quarter section 9; northwest quarter section 10; west half section 17; northeast quarter section 17; section 18; northwest quarter section 19.

Township 25 south, range 25 east: north half section 5; north half section 6.

Township 25 south, range 22 east: north half section 1; west half southwest quarter section 1; section 2; section 11; west half west half section 12; northwest quarter section 14.

Township 25 south, range 23 east: northwest quarter section 6.

All of which contains 46,786.11 acres, more or less.

And the tract of land, including Rattlesnake Springs, lying in section 23, township 25 south, range 24 east, New Mexico principal meridian, acquired by the United States for water right purposes by warranty deed dated January 23, 1934, recorded in Eddy County, New Mexico, records in deedbook 64 on page 97, containing 79.87 acres, more or less.


SECTION REFERRED TO IN OTHER SECTIONS

This section is referred to in sections 407f, 407h of this title.

§ 407f. Exchange of lands

(a) State-owned lands; terms, conditions and reservations

For the purpose of acquiring the State-owned lands lying within the area described in section 407e of this title, consisting of 2,721.12 acres, and described as follows:

NEW MEXICO PRINCIPAL MERIDIAN, NEW MEXICO

Township 24 south, range 23 east: section 36.

Township 24 south, range 24 east: section 32.

Township 25 south, range 24 east: section 32.

Township 25 south, range 24 east: lots 1, 2, 3, and 4, south half north half, southwest quarter section 2.

Township 26 south, range 22 east: south half section 2, the Secretary of the Interior may, subject to such terms, conditions, and reservations as may be necessary or are in the public interest, including the reservation of surface rights-of-way across Federal lands situated in township 25 south, range 24 east, New Mexico principal meridian, for the construction of roads and utility lines between park headquarters and Rattlesnake Springs, exchange the following described 2,719.80 acres of public land of approximately equal value:

NEW MEXICO PRINCIPAL MERIDIAN, NEW MEXICO

Township 24 south, range 25 east: southeast quarter section 34.

Township 25 south, range 24 east: south half section 1; west half section 11; west half section 14; section 15; southeast quarter section 17.

Township 25 south, range 25 east: south half section 5; lot 6, northeast quarter southwest quarter, southeast quarter section 6.

Township 26 south, range 22 east: west half west half section 13; north half northeast quarter section 14.

(b) Private lands; terms, conditions and reservations

For the purpose of acquiring the private lands or interests in lands lying within the area described in section 407e of this title, the Secre-
tary of the Interior may, subject to such terms, conditions, and reservations as may be necessary, exchange on an approximately equal value basis any of the following described lands:

**NEW MEXICO PRINCIPAL MERIDIAN, NEW MEXICO**

- Township 25 south, range 24 east: southeast quarter section 9; south half, northeast quarter section 10.
- Township 26 south, range 22 east: south half, northeast quarter section 14.

(c) State-leased lands; compensation of lessee for improvements; appraisal

Notwithstanding subsection (a) of this section, when an exchange involves lands in section 32, township 24 south, range 24 east, New Mexico principal meridian, which the State of New Mexico has leased, the Secretary may compensate a lessee for the reasonable value of his improvements to the lands. Reasonable value shall be determined by the Secretary of the Interior by obtaining an impartial appraisal.


**SECTION REFERRED TO IN OTHER SECTIONS**

This section is referred to in section 407h of this title.

§ 407g. State right-of-way for park-type road; reconveyance of interest upon completion of road

The Secretary is authorized to convey to the State of New Mexico a right-of-way over lands between the western boundary of the southeast quarter of section 34, township 24 south, range 25 east, and the vicinity of the caverns for the use of the State in constructing a park-type road for public use thereon: Provided, That the State may construct a road which shall meet the general standards of National Park Service roads and shall agree to reconvey its interests in such lands and any improvements thereon, without cost to the United States, upon completion of such road. The location of the road shall be determined by the Secretary, after consultation with officials of the State of New Mexico.


**SECTION REFERRED TO IN OTHER SECTIONS**

This section is referred to in section 407h of this title.

§ 407h. Authorization of appropriations

There are hereby authorized to be appropriated not more than $500 to carry out the purposes of sections 407e to 407h of this title.

An Act to authorize additional appropriations for the acquisition of lands and interests in lands within the Sawtooth National Recreation Area in Idaho. (92 Stat. 3467) (P.L. 95–625)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

TITLE IV—WILDERNESS

SEC. 401. The following lands are hereby designated as wilderness in accordance with section 3(c) Wilderness Act (78 Stat. 890; 16 U.S.C. 1132(c)), and shall be administered by the Secretary in accordance with applicable provisions of the Wilderness Act:

(2) Carlsbad Caverns National Park, New Mexico, wilderness comprising approximately thirty-three thousand one hundred and twenty-five acres and potential wilderness additions comprising approximately three hundred and twenty acres, depicted on a map entitled "Wilderness Plan, Carlsbad Caverns National Park, New Mexico," numbered 130–20,003–B and dated January 1978, to be known as the Carlsbad Caverns Wilderness. By January 1, 1980, the Secretary shall review the remainder of the park and shall report to the President, in accordance with section 3 (c) and (d) of the Wilderness Act (78 Stat. 891; 16 U.S.C. 1132 (c) and (d)), his recommendations as to the suitability or nonsuitability of any additional areas within the park for preservation as wilderness, and any designation of such areas as wilderness shall be accomplished in accordance with said subsections of the Wilderness Act.

SEC. 402. A map and description of the boundaries of the areas designated in this title shall be on file and available for public inspection in the office of the Director of the National Park Service, Department of the Interior, and in the Office of the Superintendent of each area designated in this title. As soon as practicable after this Act takes effect, maps of the wilderness areas and descriptions of their boundaries shall be filed with the Committee on Interior and Insular Affairs of the House of Representatives and the Committee on Energy and Natural Resources of the United States Senate, and such maps and descriptions shall have the same force and effect as if included in this Act: Provided, That correction of clerical and typographical errors in such maps and descriptions may be made.

SEC. 403. Any lands which represent potential wilderness additions in this title, upon publication in the
Federal Register of a notice by the Secretary that all uses thereon prohibited by the Wilderness Act have ceased, shall thereby be designated wilderness. Lands designated as potential wilderness additions shall be managed by the Secretary insofar as practicable as wilderness until such time as said lands are designated as wilderness.

Sec. 404. The areas designated by this Act as wilderness shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act governing areas designated by the Act as wilderness, except that any reference in such provisions to the effective date of the Wilderness Act shall be deemed to be a reference to the effective date of this Act, and, where appropriate, any reference to the Secretary of Agriculture shall be deemed to be a reference to the Secretary of the Interior.

* * * * * * * * *

Public Law 100–691
100th Congress

An Act

To protect cave resources on Federal lands, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be referred to as the "Federal Cave Resources Protection Act of 1988".

SEC. 2. FINDINGS, PURPOSES, AND POLICY.

(a) FINDINGS.—The Congress finds and declares that—

(1) significant caves on Federal lands are an invaluable and irreplaceable part of the Nation's natural heritage; and

(2) in some instances, these significant caves are threatened due to improper use, increased recreational demand, urban spread, and a lack of specific statutory protection.

(b) PURPOSES.—The purposes of this Act are—

(1) to secure, protect, and preserve significant caves on Federal lands for the perpetual use, enjoyment, and benefit of all people; and

(2) to foster increased cooperation and exchange of information between governmental authorities and those who utilize caves located on Federal lands for scientific, education, or recreational purposes.

(c) POLICY.—It is the policy of the United States that Federal lands be managed in a manner which protects and maintains, to the extent practical, significant caves.

SEC. 3. DEFINITIONS.

For purposes of this Act:

(1) CAVE.—The term "cave" means any naturally occurring void, cavity, recess, or system of interconnected passages which occurs beneath the surface of the earth or within a cliff or ledge (including any cave resource therein, but not including any vug, mine, tunnel, aqueduct, or other manmade excavation) and which is large enough to permit an individual to enter, whether or not the entrance is naturally formed or manmade. Such term shall include any natural pit, sinkhole, or other feature which is an extension of the entrance.

(2) FEDERAL LANDS.—The term "Federal lands" means lands the fee title to which is owned by the United States and administered by the Secretary of Agriculture or the Secretary of the Interior.

(3) INDIAN LANDS.—The term "Indian lands" means lands of Indian tribes or Indian individuals which are either held in trust by the United States for the benefit of an Indian tribe or subject to a restriction against alienation imposed by the United States.
Appendix A: Legislation

(4) INDIAN TRIBE.—The term “Indian tribe” means any Indian tribe, band, nation, or other organized group or community of Indians, including any Alaska Native village or regional or village corporation as defined in, or established pursuant to, the Alaska Native Claims settlement Act (43 U.S.C. 1601 et seq.).

(5) CAVE RESOURCE.—The term “cave resource” includes any material or substance occurring naturally in caves on Federal lands, such as animal life, plant life, paleontological deposits, sediments, minerals, speleogens, and speleothems.

(6) SECRETARY.—The term “Secretary” means the Secretary of Agriculture or the Secretary of the Interior, as appropriate.

(7) SPELEOTHEM.—The term “speleothem” means any natural mineral formation or deposit occurring in a cave or lava tube, including but not limited to any stalactite, stalagmite, helictite, cave flower, flowstone, concretion, drapery, rimstone, or formation of clay or mud.

(8) SPELEOGEN.—The term “speleogen” means relief features on the walls, ceiling, and floor of any cave or lava tube which are part of the surrounding bedrock, including but not limited to anastomoses, scallops, meander niches, petromorphs and rock pendants in solution caves and similar features unique to volcanic caves.

SEC. 4. MANAGEMENT ACTIONS.

(a) REGULATIONS.—Not later than nine months after the date of the enactment of this Act, the Secretary shall issue such regulations as he deems necessary to achieve the purposes of this Act. Regulations shall include, but not be limited to, criteria for the identification of significant caves. The Secretaries shall cooperate and consult with one another in preparation of the regulations. To the extent practical, regulations promulgated by the respective Secretaries should be similar.

(b) IN GENERAL.—The Secretary shall take such actions as may be necessary to further the purposes of this Act. Those actions shall include (but need not be limited to)—

(1) identification of significant caves on Federal lands:

(A) The Secretary shall prepare an initial list of significant caves for lands under his jurisdiction not later than one year after the publication of final regulations using the significance criteria defined in such regulations. Such a list shall be developed after consultation with appropriate private sector interests, including cavers.

(B) The initial list of significant caves shall be updated periodically, after consultation with appropriate private sector interests, including cavers. The Secretary shall prescribe by policy or regulation the requirements and process by which the initial list will be updated, including management measures to assure that caves under consideration for the list are protected during the period of consideration. Each cave recommended to the Secretary by interested groups for possible inclusion on the list of significant caves shall be considered by the Secretary according to the requirements prescribed pursuant to this paragraph, and shall be added to the list if the Secretary determines that the cave meets the criteria for significance as defined by the regulations.

16 USC 4303.
(2) regulation or restriction of use of significant caves, as appropriate;
(3) entering into volunteer management agreements with persons of the scientific and recreational caving community; and
(4) appointment of appropriate advisory committees.

c) PLANNING AND PUBLIC PARTICIPATION.—The Secretary shall—

(1) ensure that significant caves are considered in the preparation or implementation of any land management plan if the preparation or revision of the plan began after the enactment of this Act; and

(2) foster communication, cooperation, and exchange of information between land managers, those who utilize caves, and the public.

SEC. 5. CONFIDENTIALITY OF INFORMATION CONCERNING NATURE AND LOCATION OF SIGNIFICANT CAVES.

(a) IN GENERAL.—Information concerning the specific location of any significant cave may not be made available to the public under section 552 of title 5, United States Code, unless the Secretary determines that disclosure of such information would further the purposes of this Act and would not create a substantial risk of harm, theft, or destruction of such cave.

(b) EXCEPTIONS.—Notwithstanding subsection (a), the Secretary may make available information regarding significant caves upon the written request by Federal and State governmental agencies or bona fide educational and research institutions. Any such written request shall, at a minimum—

(1) describe the specific site or area for which information is sought;
(2) explain the purpose for which such information is sought; and
(3) include assurances satisfactory to the Secretary that adequate measures are being taken to protect the confidentiality of such information and to ensure the protection of the significant cave from destruction by vandalism and unauthorized use.

SEC. 6. COLLECTION AND REMOVAL FROM FEDERAL CAVES.

(a) PERMIT.—The Secretary is authorized to issue permits for the collection and removal of cave resources under such terms and conditions as the Secretary may impose, including the posting of bonds to insure compliance with the provisions of any permit:

(1) Any permit issued pursuant to this section shall include information concerning the time, scope, location, and specific purpose of the proposed collection, removal or associated activity, and the manner in which such collection, removal, or associated activity is to be performed must be provided.

(2) The Secretary may issue a permit pursuant to this subsection only if he determines that the proposed collection or removal activities are consistent with the purposes of this Act, and with other applicable provisions of law.

(b) REVOCATION OF PERMIT.—Any permit issued under this section shall be revoked by the Secretary upon a determination by the Secretary that the permittee has violated any provision of this Act, or has failed to comply with any other condition upon which the permit was issued. Any such permit shall be revoked by the Secretary upon assessment of a civil penalty against the permittee.
pursuant to section 8 or upon the permittee's conviction under section 7 of this Act. The Secretary may refuse to issue a permit under this section to any person who has violated any provision of this Act or who has failed to comply with any condition of a prior permit.

(c) **TRANSFERABILITY OF PERMITS.**—Permits issued under this Act are not transferable.

(d) **CAVE RESOURCES LOCATED ON INDIAN LANDS.**—(1)(A) Upon application by an Indian tribe, the Secretary is authorized to delegate to the tribe all authority of the Secretary under this section with respect to issuing and enforcing permits for the collection or removal of any cave resource, or to carrying out activities associated with such collection or removal, from any cave resource located on the affected Indian lands.

(B) In the case of any permit issued by the Secretary for the collection or removal of any cave resource, or to carry out activities associated with such collection or removal, from any cave resource located on Indian lands (other than permits issued pursuant to subparagraph (A)), the permit may be issued only after obtaining the consent of the Indian or Indian tribe owning or having jurisdiction over such lands. The permit shall include such reasonable terms and conditions as may be requested by such Indian or Indian tribe.

(2) If the Secretary determines that issuance of a permit pursuant to this section may result in harm to, or destruction of, any religious or cultural site, the Secretary, prior to issuing such permit, shall notify any Indian tribe which may consider the site as having significant religious or cultural importance. Such notice shall not be deemed a disclosure to the public for purposes of section 5.

(3) A permit shall not be required under this section for the collection or removal of any cave resource located on Indian lands or activities associated with such collection, by the Indian or Indian tribe owning or having jurisdiction over such lands.

(e) **EFFECT OF PERMIT.**—No action specifically authorized by a permit under this section shall be treated as a violation of section 7.

**SEC. 7. PROHIBITED ACTS AND CRIMINAL PENALTIES.**

(a) **PROHIBITED ACTS.**—

(1) Any person who, without prior authorization from the Secretary knowingly destroys, disturbs, defaces, mars, alters, removes or harms any significant cave or alters the free movement of any animal or plant life into or out of any significant cave located on Federal lands, or enters a significant cave with the intention of committing any act described in this paragraph shall be punished in accordance with subsection (b).

(2) Any person who possesses, consumes, sells, barters or exchanges, or offers for sale, barter or exchange, any cave resource from a significant cave with knowledge or reason to know that such resource was removed from a significant cave located on Federal lands shall be punished in accordance with subsection (b).

(3) Any person who counsels, procures, solicits, or employs any other person to violate any provisions of this subsection shall be punished in accordance with section (b).

(4) Nothing in this section shall be deemed applicable to any person who was in lawful possession of a cave resource from a significant cave prior to the date of enactment of this Act.
APPENDIXES

16 USC 4307.

SEC. 8. CIVIL PENALTIES.

(a) ASSESSMENT.—(1) The Secretary may issue an order assessing a civil penalty against any person who violates any prohibition contained in this Act, any regulation promulgated pursuant to this Act, or any permit issued under this Act. Before issuing such an order, the Secretary shall provide such person written notice and the opportunity to request a hearing on the record within 30 days. Each violation shall be a separate offense, even if such violations occurred at the same time.

(2) The amount of such civil penalty shall be determined by the Secretary taking into account appropriate factors, including (A) the seriousness of the violation; (B) the economic benefit (if any) resulting from the violation; (C) any history of such violations; and (D) such other matters as the Secretary deems appropriate. The maximum fine permissible under this section is $10,000.

(b) JUDICIAL REVIEW.—Any person aggrieved by an assessment of a civil penalty under this section may file a petition for judicial review of such assessment with the United States District Court for the District of Columbia or for the district in which the violation occurred. Such a petition shall be filed within the 30-day period beginning on the date the order assessing the civil penalty was issued.

(c) COLLECTION.—If any person fails to pay an assessment of a civil penalty—

(1) within 30 days after the order was issued under subsection (a), or

(2) if the order is appealed within such 30-day period, within 10 days after court has entered a final judgment in favor of the Secretary under subsection (b),

the Secretary shall notify the Attorney General and the Attorney General shall bring a civil action in an appropriate United States district court to recover the amount of penalty assessed (plus costs, attorney's fees, and interest at currently prevailing rates from the date the order was issued or the date of such final judgment, as the case may be). In such an action, the validity, amount, and appropriateness of such penalty shall not be subject to review.

(d) SUBPOENAS.—The Secretary may issue subpoenas in connection with proceedings under this subsection compelling the attendance and testimony of witnesses and subpoenas duces tecum, and may request the Attorney General to bring an action to enforce any subpoena under this section. The district courts shall have jurisdiction to enforce such subpoenas and impose sanctions.

SEC. 9. MISCELLANEOUS PROVISIONS.

(a) AUTHORIZATION.—There are authorized to be appropriated $100,000 to carry out the purposes of this Act.

(b) EFFECT ON LAND MANAGEMENT PLANS.—Nothing in this Act shall require the amendment or revision of any land management
plan the preparation of which began prior to the enactment of this Act.

(c) Fund.—Any money collected by the United States as permit fees for collection and removal of cave resources; received by the United States as a result of the forfeiture of a bond or other security by a permittee who does not comply with the requirements of such permit issued under section 7; or collected by the United States by way of civil penalties or criminal fines for violations of this Act shall be placed in a special fund in the Treasury. Such moneys shall be available for obligation or expenditure (to the extent provided for in advance in appropriation Acts) as determined by the Secretary for the improved management, benefit, repair, or restoration of significant caves located on Federal lands.

(d) Nothing in this Act shall be deemed to affect the full operation of the mining and mineral leasing laws of the United States, or otherwise affect valid existing rights.

SEC. 10. SAVINGS PROVISIONS.

(a) Water.—Nothing in this Act shall be construed as authorizing the appropriation of water by any Federal, State, or local agency, Indian tribe, or any other entity or individual. Nor shall any provision of this Act—

1. affect the rights or jurisdiction of the United States, the States, Indian tribes, or other entities over waters of any river or stream or over any ground water resource;

2. alter, amend, repeal, interpret, modify, or be in conflict with any interstate compact made by the States; or

3. alter or establish the respective rights of States, the United States, Indian tribes, or any person with respect to any water or water-related right.

(b) Fish and Wildlife.—Nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the States with respect to fish and wildlife.

Approved November 18, 1988.

LEGISLATIVE HISTORY—H.R. 1975:

HOUSE REPORTS: No. 100-534 (Comm. on Interior and Insular Affairs).
SENATE REPORTS: No. 100-559 (Comm. on Energy and Natural Resources).
Mar. 28, considered and passed House.
Oct. 21, considered and passed Senate, amended. House concurred in Senate amendment.
PUBLIC LAW 103-169 [H.R. 698]; December 2, 1993

LECHUGUILLA CAVERN PROTECTION ACT OF 1993

An Act to protect Lechuguilla Cave and other resources and values in and adjacent to Carlsbad Caverns National Park.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Lechuguilla Cave Protection Act of 1993".

SEC. 2. FINDING.

Congress finds that Lechuguilla Cave and adjacent public lands have internationally significant scientific, environmental, and other values, and should be retained in public ownership and protected against adverse effects of mineral exploration and development and other activities presenting threats to the areas.

SEC. 3. LAND WITHDRAWAL.

(a) WITHDRAWAL.—Subject to valid existing rights, all Federal lands within the boundaries of the cave protection area described in subsection (b) are hereby withdrawn from all forms of entry, appropriation, or disposal under the public land laws; from location, entry, and patent under the United States mining laws; and from disposition under all laws pertaining to mineral and geothermal leasing, and all amendments thereto.

(b) LAND DESCRIPTION.—The cave protection area referred to in subsection (a) shall consist of approximately 6,280 acres of lands in New Mexico as generally depicted on the map entitled "Lechuguilla Cave Protection Area" numbered 130/80,055 and dated April 1993.

(c) PUBLICATION, FILING, CORRECTION, AND INSPECTION.—(1) As soon as practicable after the date of enactment of this Act, the Secretary of the Interior (hereinafter referred to as the "Secretary") shall publish in the Federal Register the legal description of the lands withdrawn under subsection (a) and shall file such legal description and a detailed map with the Committee on Energy and Natural Resources of the United States Senate and the Committee on Natural Resources of the United States House of Representatives.
(2) Such map and legal description shall have the same force and effect as if included in this Act except that the Secretary may correct clerical and typographical errors.

(3) Copies of such map and legal description shall be available for inspection in the appropriate offices of the Bureau of Land Management.

SEC. 4. MANAGEMENT OF EXISTING LEASES.

(a) SUSPENSION.—The Secretary shall not permit any new drilling on or involving any Federal mineral or geothermal lease within the cave protection area referred to in section 3(a) until the effective date of the Record of Decision for the Dark Canyon Environmental Impact Statement, or for 12 months after the date of enactment of this Act, whichever occurs first.

(b) AUTHORITY TO CANCEL EXISTING MINERAL OR GEOTHERMAL LEASES.—Upon the effective date of the Record of Decision for the Dark Canyon Environmental Impact Statement and in order to protect Lechuguilla Cave or other cave resources, the Secretary is authorized to—

(1) cancel any Federal mineral or geothermal lease in the cave protection area referred to in section 3(a); or

(2) enter into negotiations with the holder of a Federal mineral or geothermal lease in the cave protection area referred to in section 3(a) to determine appropriate compensation, if any, for the complete or partial termination of such lease.

SEC. 5. ADDITIONAL PROTECTION AND RELATION TO OTHER LAWS.

(a) IN GENERAL.—In order to protect Lechuguilla Cave or Federal lands within the cave protection area, the Secretary, subject to valid existing rights, may limit or prohibit access to or across lands owned by the United States or prohibit the removal from such lands of any mineral, geological, or cave resources: Provided, That existing access to private lands within the cave protection area shall not be affected by this subsection.

(b) NO EFFECT ON PIPELINES.—Nothing in this title shall have the effect of terminating any validly issued right-of-way, or customary operation, maintenance, repair, and replacement activities in such right-of-way; prohibiting the upgrading of and construction on existing facilities in such right-of-way for the purpose of increasing capacity of the existing pipeline; or prohibiting the renewal of such right-of-way within the cave protection area referred to in section 3(a).

(c) RELATION TO OTHER LAWS.—Nothing in this Act shall be construed as increasing or diminishing the ability of any party to seek compensation pursuant to other applicable law, including but not limited to the Tucker Act (28 U.S.C. 1491), or as precluding any defenses or claims otherwise available to the United States in connection with any action seeking such compensation from the United States.
SEC. 6. AUTHORIZATION OF APPROPRIATIONS.

There is hereby authorized to be appropriated such sums as may be necessary to carry out this Act. Provided, That no funds shall be made available except to the extent, or in such amounts as are provided in advance in appropriation Acts.

Approved December 2, 1993.
# APPENDIX B: CULTURAL RESOURCE COMPLIANCE REQUIREMENTS

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<tr>
<td><strong>ACTIONS COMMON TO ALL ALTERNATIVES</strong></td>
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<tr>
<td>Park General</td>
<td>• Inventory and evaluate cultural resources as described in the park’s <em>Resources Management Plan</em>, including historic resources in cavern and historic district, along waterline route, and at water tanks area.</td>
<td>• No effect from repaving road if overlay only.</td>
<td>• SHPO to review inventory and evaluation data.</td>
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<td>• Avoid significant resources during construction or other ground-disturbing activities.</td>
<td>• No adverse effect of rehabilitating visitor center, removing temporary structures.</td>
<td>• See individual actions below.</td>
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<td>• If avoidance is impossible, develop mitigating measures in consultation with the New Mexico state historic preservation officer (SHPO) and Advisory Council on Historic Preservation (ACHP).</td>
<td>• Other actions — generally no effect or no adverse effect. See specific items below.</td>
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<td>• Monitor or use other mitigating measures to ensure that removal of existing nonhistoric facilities does not disturb archeological resources.</td>
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<td>• Use sensitive design to help ensure that proposals for parking lots, visitor center, water tanks and lines, and other areas are compatible with cultural landscapes.</td>
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<td>• Continue to consult with affiliated Indian tribes to help protect ethnographic resources.</td>
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<td>• Monitor resource condition and respond to threats.</td>
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<td>• Educate visitors about resource protection.</td>
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<td><strong>ALTERNATIVE 1</strong></td>
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<tr>
<td>Cavern Area / Caverns Historic District</td>
<td>• Test new techniques and equipment within cavern to reduce visitor impacts to cave resources; replace cavern trails with more appropriate material. • Continue adaptive use of historic buildings. • Remodel interior of visitor center. • Remove temporary building near visitor center. • Improve parking lot drainage, possible improvements to circulation. • Replace water system.</td>
<td>• Same as above.</td>
<td>• No adverse effect. • Work on cavern facilities requires further SHPO/ACHP review. • No further compliance needed to maintain structures (programmatic exclusion) and remove temporary building. • Further SHPO/ACHP review needed to remodel nonhistoric (noncontributing) buildings. • Parking lot modifications may require further SHPO/ACHP review. • Waterline, tank construction requires further SHPO/ACHP review.</td>
</tr>
<tr>
<td>Walnut Canyon Desert Drive and Chihuahuan Desert Nature Trail</td>
<td>• Continue present use of drive and nature trail.</td>
<td>• No known national register properties, but future survey and evaluation needed.</td>
<td>• No effect.</td>
</tr>
<tr>
<td>Lechuguilla Cave</td>
<td>• Continue restricted access (qualified research teams only).</td>
<td>• No known national register properties, but future survey and evaluation needed. • Educate cavers about archeological and paleontological resource protection. • Revise Cave Management Plan to provide additional protection for cultural and paleontological resources.</td>
<td>• No adverse effect.</td>
</tr>
<tr>
<td>Slaughter Canyon Cave/Trail</td>
<td>• Offer guided tours.</td>
<td>• No known national register properties, but future survey and evaluation needed.</td>
<td>• Potential for short-term adverse effect until inventories and evaluations completed; with mitigation, no adverse effect.</td>
</tr>
<tr>
<td>Rattlesnake Springs Historic District</td>
<td>• Manage as a cultural landscape.</td>
<td>• Revise Rattlesnake Springs landscape management plan.</td>
<td>• No adverse effect.</td>
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</table>
### Appendix B: Cultural Resource Compliance Requirements

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<tr>
<td><strong>Backcountry Areas</strong></td>
<td>• Maintain primitive trails.</td>
<td>• Same as “Actions Common to All Alternatives.”</td>
<td>• If no resources found in project areas, document with SHPO. No further compliance necessary.</td>
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<td><strong>ALTERNATIVE 2</strong></td>
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<tr>
<td><strong>Cavern Area / Caverns Historic District</strong></td>
<td>• Redesign visitor center.</td>
<td>• Same as described in “Actions Common to All Alternatives.”</td>
<td>• For trails, no further compliance necessary unless significant resources found during trail corridor survey.</td>
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<td>• Install new facilities within cavern to reduce impacts to cave resources; replace cavern trails with more appropriate material.</td>
<td>• Adaptive use of historic structures would meet secretary’s standards.</td>
<td>• SHPO/ACHP review of DCP/EA.</td>
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<td>• Adaptively use historic buildings (passive uses); rehabilitate and adaptively use headquarters building for environmental education center, move most other functions off escarpment (pending results of infiltration and hazard studies and development of DCP).</td>
<td>• No adverse effect for most actions; possible adverse effect of removing structures from historic landscape.</td>
<td>• Develop memorandum of understanding among SHPO, ACHP, NPS to remove structures, functions from Caverns Historic District.</td>
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<td>• Remove maintenance structures and recent housing.</td>
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<td>• Remove temporary building.</td>
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<td>• Redesign and resurface parking lots.</td>
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<td>• Develop geologic interpretive trail.</td>
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<td><strong>Park Entrance Road</strong></td>
<td>• Provide pullout for cave tour information.</td>
<td>• No known national register properties, but future survey and evaluation needed.</td>
<td>• Further review by SHPO/ACHP only if significant resources located during site-specific surveys.</td>
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<tr>
<td></td>
<td>• Inventory and evaluate cultural resources and develop mitigating measures as described in “Actions Common to All Alternatives.”</td>
<td>• No adverse effect.</td>
<td></td>
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<tr>
<td><strong>Lechuguilla Cave</strong></td>
<td>• Continue restricted access (qualified research teams only).</td>
<td>• No known national register properties, but future survey and evaluation needed.</td>
<td>• No further compliance necessary if Cave Management Plan revised to include protection of paleontological/archeological resources.</td>
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<td>• Same as alternative 1.</td>
<td>• No adverse effect.</td>
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<tr>
<td><strong>Walnut Canyon Desert Drive and Chihuahuan Desert Nature Trail</strong></td>
<td>• Improve drive.</td>
<td>• No known national register properties, but future survey and evaluation needed.</td>
<td>• Road improvement may require further SHPO/ACHP review if significant resources found during corridor survey.</td>
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<td>• Continue use of nature trail.</td>
<td>• Same as “Actions Common to All Alternatives.”</td>
<td>• No adverse effect.</td>
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<tr>
<th>AREA/PROPOSED ACTIONS</th>
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</table>
| Slaughter Canyon Cave and Trail, and Ogle Cave | • No known national register properties, but Ogle Cave resources are thought to be significant; future survey and evaluation needed.  
• As described above ("Common to All") inventory and evaluate cultural resources in caves and along trail.  
• Develop protective measures to prevent damage to resources during tours.  
• Gate cave entrance. | • Potential for adverse effect from opening Ogle Cave.  
• Constructing ranger housing provides NPS presence in area. | • No further compliance necessary for Slaughter Canyon cave tours if cave management plan revised to include protection of paleontological/archeological resources.  
• Further review by SHPO/ACHP needed to document Ogle Cave, complete tunnel entrance, and develop mitigating measures to protect resources if significant resources found during trail survey. No further compliance needed for ranger housing. |
| Rattlesnake Springs Historic District | • Implement studies and recommendations described in appendix C.  
• Same as "Actions Common to All Alternatives." | • No adverse effect if managed as a cultural landscape. | • SHPO/ACHP review of revised landscape management plan. |
| Park General | • Improve maintenance of existing primitive backcountry trails.  
• Inventory and evaluate cultural resources along trails, and avoid or mitigate as described in "Actions Common to All Alternatives." | • No adverse effect. | • Further review by SHPO/ACHP only if significant resources found during site-specific surveys. |
| Below Escarpment | • Develop new park administrative, housing, maintenance facilities, access roads.  
• No known national register properties, but future survey and evaluation needed.  
• Use sensitive design and location to help ensure development does not intrude on viewshed from escarpment. Also see "Actions Common to All Alternatives" above. | • No adverse effect. | • SHPO/ACHP review of DCP/EA. |
| ALTERNATIVE 3 | | | |
| Cavern Area / Caverns Historic District | • Inventory, evaluate, and avoid cultural resources as described for alternative 2 and in "Actions Common to All Alternatives" above. | • Removal of structures and other facilities from historic district would have an adverse effect on the cultural landscape. | • SHPO/ACHP review of DCP/EA.  
• Further SHPO/ACHP review needed if significant resources found during surveys of trail corridors.  
• Develop memorandum of understanding among SHPO, ACHP, NPS to remove structures from the Caverns Historic District. |
## Appendix B: Cultural Resource Compliance Requirements

<table>
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<th>Area/Proposed Actions</th>
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<th>Proposed Effect</th>
<th>Further 106 Compliance Requirements</th>
</tr>
</thead>
</table>
| **Slaughter Canyon**  | • No known national register properties, but future survey and evaluation needed.  
  • Same as alternative 2. | • No adverse effect.  
  • Positive effect of staffed visitor contact station (NPS presence). | • Further SHPO/ACHP review needed if significant resources found during site-specific trail surveys.  
  • No further compliance needed to construct visitor contact station except documentation of no resources with SHPO. |
| **Park General**      | • Inventory and evaluate cultural resources in vicinity of cave openings. | • No adverse effect. | • Further SHPO/ACHP review needed if significant resources found during site-specific surveys. |
| **Lechuguilla Cave**  | • No known national register properties, but future survey and inventory needed.  
  • Same as alternative 2. | • No adverse effect. | • Same as above. |
| **Walnut Canyon Desert Drive and Chihuahuan Desert Nature Trail** | • No known national register properties, but future survey and inventory needed.  
  • Same as alternative 2. | • No adverse effect. | • Same as above. |
| **Rattlesnake Springs Historic District** | • Implement studies and recommendations described in appendix C.  
  • Same as “Actions Common to All Alternatives.” | • No adverse effect if managed as a cultural landscape. | • SHPO/ACHP review of revised landscape management plan. |
| **Below Escarpment**  | • No known national register properties, but future survey and evaluation needed.  
  • Inventory and evaluate cultural resources at development area, along access roads (including nonfederal bridge locale at Whites City), and avoid during construction. (See “Actions Common to All Alternatives.”)  
  • Use sensitive design and location to help ensure that development does not intrude on viewshed from escarpment. | • Potential adverse effect (large archaeological site in area may be unavoidable). | • SHPO/ACHP review of DCP/EA.  
  • Develop memorandum of understanding among SHPO, ACHP, NPS. |
APPENDIX C: MANAGEMENT STRATEGY FOR RATTLESNAKE SPRINGS: WATER, WETLANDS AND CULTURAL LANDSCAPE

INTRODUCTION

Water is the lifeblood of the Southwest, especially in the arid desert lands surrounding Carlsbad Caverns. Rattlesnake Springs, a detached unit of Carlsbad Caverns National Park, was acquired by the National Park Service in 1934 for the primary purpose of ensuring a reliable domestic water supply for cavern area development. A water supply pipeline from the spring to the cavern area, which is still in use, was completed in 1935. The water supply for the cavern is from a well that taps the same aquifer as the springs. The springs also provide water for irrigating NPS lands and for water uses on private lands such as the adjacent Washington Ranch. NPS water rights for irrigation and municipal purposes are described in a 1960 U.S. District Court decision and are senior to those of Washington Ranch. The Park Service monitors diversions from the springs.

Over the years the 4,000-foot-long stream and wetland system at Rattlesnake Springs has been sustained by the remaining undiverted springflow. Originally a treeless marsh, this area has been altered by human development and use. (Nearly 90% of riparian areas in the Southwest have been depleted or ecologically altered by human actions.) Still, this stream/wetland complex constitutes an extraordinary natural resource of state and regional significance. Wetlands bordering the streamcourse provide habitat for an unusual number and variety of animals, birds, and other biota. Over 300 species of birds, nearly 40 species of amphibians and reptiles, and 30 species of mammals occur at Rattlesnake Springs. Wildlife watching, especially for birds, is an extremely popular activity there. A high priority for the park is preserving the riparian habitat at Rattlesnake Springs for threatened or endangered species such as the state endangered Bell’s vireo, gray vireo, plain-bellied water snake, green-throat darter, and the federally listed southwestern willow flycatcher. The area, however, is much more than just a water source for the park or a natural area of note. The spring was used by prehistoric peoples and historic Indian groups, soldiers, travelers, and settlers. When Henry Harrison homesteaded the area around the spring in the 1880s, he developed the spring, built an irrigation system for his fields, constructed an adobe home, and planted trees and orchards. Following acquisition by the National Park Service, the area was further developed by the Civilian Conservation Corps and used by the military during World War II. During more recent times, the Park Service has further developed the spring area, concreting the pond and ditches, building a pumphouse, and managing the vegetation. Irrigation water is used to maintain the landscape surrounding the spring. For its significant role in our nation’s history, this area has been recognized as the Rattlesnake Springs Historic District and is listed on the National Register of Historic Places.

Because of this special combination of significant natural and cultural features, the Rattlesnake Springs unit has recently been reexamined and inventoried as a potential cultural landscape (NPS, Colby 1993a). A cultural landscape may be described as an expression of human adaptation to and use of the natural resources of an area. All historic landscapes evolved from and depend on natural resources — interconnected systems of land, air and water, and native vegetation and wildlife. Human land use alters many of these systems, either deliberately or accidentally.

Cultural traditions are reflected in the manner by which a property is divided and used, in the spatial organization of features, by the systems of circulation that allow movement through the area, by the types of structures built, and by the purposeful planting of trees and shrubs. Some of the significant characteristics of this landscape include the irrigation system and the spring, plantings, and architectural features.
This area retains and embodies the distinct character of early settlement and irrigation farming in the West. This rural character is visible today as a mosaic containing open irrigated fields on level ground, cottonwoods along the irrigation ditches and the watercourse, green vegetation surrounding the ordered fruit trees that line the winding access road and adjacent picnic area. The area’s most prominent architectural features include the small adobe ranch house and concrete pumphouse typical of NPS rustic design using regional styles (both Pueblo and Territorial Revival). The irrigation system with its gravity flow and concrete-lined ditches and pond, sluice gates, and berms is also an important feature of the landscape.

The oasis is bounded by the gently rolling Chihuahuan Desert plains dotted with desert scrub such as creosote bush, yucca, mesquite, and snakeweed. These plains are framed by the magnificent backdrop of the Guadalupe escarpment. The spatial arrangement and organization of the spring area, the continuing land use, and the wetlands are some of the prominent features of this landscape that are reminders of the past.

PROBLEM STATEMENT

The challenge at Rattlesnake Springs is to facilitate the link of cultural resources (human intervention) with the area’s natural systems, while maintaining a secure water supply for the park. Managing the area as a cultural landscape would give the Park Service an unparalleled opportunity to maintain and preserve historic features while enhancing biotic resources. The major constraint faced by NPS planners is the lack of adequate resource information to develop management strategies.

INFORMATION/STUDIES REQUIRED FOR RATTLESNAKE SPRINGS

To prepare and effectively implement a plan to manage Rattlesnake Springs as a cultural landscape, much information is needed on both cultural and natural elements (NPS, Colby 1993a; pers. comm., NPS, Wagner, 1993). Recommendations for future studies are listed in priority order below.

1. Summarize and integrate existing information on the Rattlesnake Springs stream/wetland system’s characteristics, functions, and values, including flow, water level, topography, soil characteristics, subsurface vs. surface irrigation return flows to the channel, existing hydrology/use of the drainage (NPS and adjacent landowner use), and historic/original dimensions of the drainage.

2. Complete mapping of vegetation communities, and conduct wildlife surveys and studies, such as documenting and mitigating brood parasitism by cowbirds; inventory prehistoric and historic archeological resources.

3. Work cooperatively with the Rattlesnake Springs Nature Conservancy unit to determine and assess the historic/pre-drainage wetland configuration, based on remnant hydric soils and to evaluate the effects of meander channelization and other built features.

4. Complete a cultural landscape report for Rattlesnake Springs. This report would outline further recommendations regarding site management and develop a hierarchy of preservation and protection for the landscape elements based on their significance.

5. Establish monitoring programs for both natural and cultural resources.

6. Develop options to manage wetlands and cultural resources in a manner that is consistent with maintaining and protecting the NPS water supply and water rights.

7. Revise the national register nominations to include the Rattlesnake Springs cultural landscape.
PRELIMINARY RECOMMENDATIONS

It is important to prevent loss of any primary character-defining features before recommended studies can be completed. A determination must be made soon as to whether the present irrigation levels and resource management practices are adequate to preserve plantings and other character-defining features of the cultural landscape. If so, current management practices would continue until the recommended studies have been completed and their recommendations have been integrated into the park’s Resources Management Plan; otherwise minor adjustments in management of the unit would be needed.

Following the completion of the studies described above and any necessary adjustments to unit management, the following actions would be taken:

1. An interdisciplinary NPS team would evaluate and integrate study results from studies 1–7 above. At an appropriate time, outside parties (The Nature Conservancy, independent technical experts, etc.) could be called to consult with the team. Scenarios such as pursuing joint funding between the Park Service and the Nature Conservancy would be explored.

2. The interdisciplinary team would help determine a strategy and guidelines for enhancing the riparian ecosystem while preserving the character-defining features of the cultural landscape.

3. The park’s Resources Management Plan would be amended to reflect the recommendations from the final natural and cultural resource studies defined above.

4. Project statements for the Resources Management Plan would be developed to address the preceding three recommendations.

5. The Rattlesnake Springs Management Plan would be revised to incorporate the information and recommendations from the above studies.
APPENDIX D: PLAN PHASING, CONSTRUCTION COSTS, AND ADDITIONAL RESOURCE STUDIES

PLAN PHASING AND IMPLEMENTATION

The proposed actions (alternative 2) would be implemented over the next 15 years. The actions have been divided into phases to identify priorities for funding and to guide implementation.

Phase I: 2–5 Years

Phase I actions are considered high priority for one or more of the following reasons: They address crucial resource protection needs, they remedy serious maintenance concerns, they accommodate immediate resource interpretation needs, or they must be accomplished before certain subsequent general management plan actions can be taken. If phase I studies indicated that significant resources were being adversely affected, corrective actions would necessarily be the park’s highest priority. Phase I actions include the following:

- Conduct an infiltration/hazard study.
- Conduct experimental studies to address lint abatement, cave trail material/alignment, and visitor impacts on cave formations; decide on technological and staff needs to protect Carlsbad Cavern.
- Conduct Rattlesnake Springs natural and cultural resource studies.
- Improve Lechuguilla Cave airlock/culvert.
- Assess the structural condition of elevators.
- Implement a new Lechuguilla interpretive audiovisual program.
- Improve Walnut Canyon desert drive.
- Reevaluate/replace the existing water supply system for the park.
- Repave the entrance road (eligible for federal lands highway program funds).
- Initiate the visitor experience and resource protection (VERP) program and determine long-term requirements for monitoring and decision making.

Phase II: 5–10 Years

Phase II actions are second priority for one or more of the following reasons: They address routine or less serious maintenance needs, they would require or benefit from the results of phase I studies, they would address intermediate priority resource protection needs, or they would address intermediate orientation/interpretation needs. Actions that are marked with an asterisk could be done concurrently for efficiency and cost savings.

- Complete a development concept plan to decide the future of surface facilities over Carlsbad Cavern.
- Replace the Carlsbad Cavern trail with appropriate material, as determined by experimental studies.
- Conduct studies to determine the effects of human activity on bat flights.
- Replace elevator structural members (sooner if indicated by a structural engineering assessment).*
- Replace or upgrade the elevator roof to fix the condensation/leakage problem.*
- Remodel the visitor center and provide new interpretive exhibits.*
- Provide a road pullout near Whites City for visitor information on cavern tours.

Phase III: 10–15 Years

Phase III actions are the third priority for one or more of the following reasons: They depend on the results of phase I or II studies, they are lower priority resource protection needs, or they are lower priority interpretive needs.

- Provide a ranger residence at Slaughter Canyon.
- Replace Putman cabin.
- Rehabilitate stone structures in the Caverns Historic District.
- Provide a geologic interpretive trail.
- Complete a need assessment and feasibility study of opening Ogle Cave to visitor tours; if feasible, finish the Ogle Cave tunnel and provide a trail to the cave.
CONSTRUCTION COSTS

Estimated construction costs for the alternatives are listed below. Less costly options may be available in some cases. Costs for annual operations, staffing, interpretive media, and studies are not included in construction costs. Costs are standard class C estimates in 1994 dollars. For current year estimates, add 5% per year.

<table>
<thead>
<tr>
<th>ACTION</th>
<th>GROSS CONSTRUCTION COSTS</th>
<th>ADVANCE AND PROJECT PLANNING COSTS</th>
<th>TOTAL PROJECT COSTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure Rehabilitation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace domestic water system</td>
<td>3,355,547</td>
<td>670,000</td>
<td>4,025,547</td>
</tr>
<tr>
<td>Replace or upgrade elevator structural members</td>
<td>1,300,000</td>
<td>271,000</td>
<td>1,571,000</td>
</tr>
<tr>
<td>Replace waterlines in Caverns Historic District</td>
<td>100,818</td>
<td>19,240</td>
<td>120,058</td>
</tr>
<tr>
<td>Replace sewerlines in Caverns Historic District</td>
<td>144,781</td>
<td>27,630</td>
<td>172,411</td>
</tr>
<tr>
<td>Replace elevator tower roof</td>
<td>4,192</td>
<td>800</td>
<td>4,992</td>
</tr>
<tr>
<td>Repave existing asphalt entrance road (eligible for Federal Lands Highway Program funds)</td>
<td>3,423,816</td>
<td>653,400</td>
<td>4,077,216</td>
</tr>
<tr>
<td>Alternative 1 Total</td>
<td></td>
<td></td>
<td>9,971,224</td>
</tr>
</tbody>
</table>
Alternative 2: Proposed Action

As discussed in the plan, after the infiltration/hazard study has been completed, a development concept plan would be undertaken to specify actions to reduce adverse impacts of surface facilities and activities on Carlsbad Cavern; these actions could range from technological measures to mitigate impacts (minimum estimated cost: $2 million) to partial removal of facilities, to the maximum relocation of facilities as described in the plan. The cost of alternative 2 without considering relocation actions is $21,736,213 (see table D-2); the additional estimated cost of maximum relocation is $22,482,928 (see table D-3).

<table>
<thead>
<tr>
<th>Action</th>
<th>Gross Construction Costs</th>
<th>Advance and Project Planning Costs</th>
<th>Total Project Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infrastructure Rehabilitation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace domestic water system</td>
<td>3,355,547</td>
<td>670,000</td>
<td>4,025,547</td>
</tr>
<tr>
<td>Replace or upgrade elevator structural members</td>
<td>1,300,000</td>
<td>271,000</td>
<td>1,571,000</td>
</tr>
<tr>
<td>Improve Walnut Canyon desert drive</td>
<td>376,939</td>
<td>71,935</td>
<td>448,874</td>
</tr>
<tr>
<td>Replace elevator tower roof</td>
<td>4,192</td>
<td>800</td>
<td>4,992</td>
</tr>
<tr>
<td>Repave existing entrance road (eligible for federal lands highway program funds)</td>
<td>3,423,816</td>
<td>653,400</td>
<td>4,077,216</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>10,127,629</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cave Resource Actions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improve Lechuguilla Cave airlock/culvert</td>
<td>26,200</td>
<td>5,000</td>
<td>31,200</td>
</tr>
<tr>
<td>Replace trail in Carlsbad Cavern</td>
<td>2,720,608</td>
<td>519,200</td>
<td>3,239,808</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>3,271,008</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Slaughter Canyon Area</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construct three-bedroom ranger residence</td>
<td>186,675</td>
<td>35,625</td>
<td>222,300</td>
</tr>
<tr>
<td>Construct trail to Ogle Cave</td>
<td>98,250</td>
<td>18,750</td>
<td>117,000</td>
</tr>
<tr>
<td>Complete pedestrian tunnel into Ogle Cave</td>
<td>327,500</td>
<td>62,500</td>
<td>390,000</td>
</tr>
<tr>
<td>Install securable/sealable door on Ogle Cave</td>
<td>32,750</td>
<td>6,250</td>
<td>39,000</td>
</tr>
<tr>
<td>Install footbridge inside entrance to Ogle Cave</td>
<td>5,502</td>
<td>1,050</td>
<td>6,552</td>
</tr>
<tr>
<td>Replace trailhead vault toilets with composting toilets</td>
<td>104,800</td>
<td>20,000</td>
<td>124,800</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>899,652</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACTION</td>
<td>GROSS CONSTRUCTION COSTS</td>
<td>ADVANCE AND PROJECT PLANNING COSTS</td>
<td>TOTAL PROJECT COSTS</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------</td>
<td>------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Visitor Center Area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rehabilitate/remodel visitor center interior</td>
<td>2,882,000</td>
<td>550,000</td>
<td>3,432,000</td>
</tr>
<tr>
<td>Restore/replace visitor center exterior</td>
<td>300,645</td>
<td>57,375</td>
<td>358,020</td>
</tr>
<tr>
<td>Construct/configure visitor center plaza and walkways</td>
<td>65,500</td>
<td>12,500</td>
<td>78,000</td>
</tr>
<tr>
<td>Construct observation deck and shade structure</td>
<td>425,750</td>
<td>81,250</td>
<td>507,000</td>
</tr>
<tr>
<td>Relandscape visitor center exterior</td>
<td>45,850</td>
<td>8,750</td>
<td>54,600</td>
</tr>
<tr>
<td>Construct geologic interpretive trail</td>
<td>47,160</td>
<td>9,000</td>
<td>56,160</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
<td>4,485,780</td>
</tr>
<tr>
<td>Other Areas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace Putman cabin</td>
<td>26,724</td>
<td>5,100</td>
<td>31,824</td>
</tr>
<tr>
<td>Rehabilitate interior and exterior of historic structures in Caverns Historic District</td>
<td>2,452,320</td>
<td>468,000</td>
<td>2,920,320</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
<td>2,952,144</td>
</tr>
<tr>
<td>Alternative 2 Total (actions to be decided by future development concept plan are not included)</td>
<td></td>
<td></td>
<td>21,736,213</td>
</tr>
</tbody>
</table>

**TABLE D-3: ALTERNATIVE 2 — ADDITIONAL CONSTRUCTION COSTS WITH MAXIMUM RELOCATION OF FACILITIES**

<table>
<thead>
<tr>
<th>ACTION</th>
<th>GROSS CONSTRUCTION COSTS</th>
<th>ADVANCE AND PROJECT PLANNING COSTS</th>
<th>TOTAL PROJECT COSTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visitor Center Area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remove asphalt pavement from three parking lots and repave with concrete</td>
<td>4,002,050</td>
<td>763,750</td>
<td>4,765,800</td>
</tr>
<tr>
<td>Install system to treat water running off parking lots</td>
<td>131,000</td>
<td>25,000</td>
<td>156,000</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
<td>4,921,800</td>
</tr>
<tr>
<td>New Off-Escarpment Park Operations Center</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construct headquarters/administration building</td>
<td>1,994,475</td>
<td>380,625</td>
<td>2,375,100</td>
</tr>
<tr>
<td>Construct dormitory for seasonal employees</td>
<td>1,310,000</td>
<td>250,000</td>
<td>1,560,000</td>
</tr>
<tr>
<td>Construct apartments for seasonal employees with families</td>
<td>605,220</td>
<td>115,500</td>
<td>720,720</td>
</tr>
<tr>
<td>Construct duplex for permanent employees</td>
<td>353,700</td>
<td>67,500</td>
<td>421,200</td>
</tr>
<tr>
<td>Construct maintenance building</td>
<td>2,259,750</td>
<td>431,250</td>
<td>2,691,000</td>
</tr>
<tr>
<td>Construct paint storage building</td>
<td>94,320</td>
<td>18,000</td>
<td>112,320</td>
</tr>
</tbody>
</table>

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### Appendix D: Plan Phasing, Construction Costs, and Proposed Studies

<table>
<thead>
<tr>
<th>ACTION</th>
<th>GROSS CONSTRUCTION COSTS</th>
<th>ADVANCE AND PROJECT PLANNING COSTS</th>
<th>TOTAL PROJECT COSTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construct open maintenance garage</td>
<td>104,800</td>
<td>20,000</td>
<td>124,800</td>
</tr>
<tr>
<td>Construct maintenance parking/storage yard</td>
<td>235,800</td>
<td>45,000</td>
<td>280,800</td>
</tr>
<tr>
<td>Construct recreation/exercise building</td>
<td>425,750</td>
<td>81,250</td>
<td>507,000</td>
</tr>
<tr>
<td>Construct access road</td>
<td>2,656,051</td>
<td>506,880</td>
<td>3,162,931</td>
</tr>
<tr>
<td>Install water- and sewerlines</td>
<td>574,094</td>
<td>109,560</td>
<td>683,654</td>
</tr>
<tr>
<td>Install electrical and telephone lines</td>
<td>21,442</td>
<td>4,092</td>
<td>25,534</td>
</tr>
<tr>
<td>Bury existing electrical and telephone lines</td>
<td>691,680</td>
<td>132,000</td>
<td>823,680</td>
</tr>
<tr>
<td>Landscape the above facilities with native plants, site work</td>
<td>1,519,600</td>
<td>290,000</td>
<td>1,809,600</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>15,298,339</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Removal/Rehabilitation of Facilities at Cavern Entrance Area

<table>
<thead>
<tr>
<th>ACTION</th>
<th>GROSS CONSTRUCTION COSTS</th>
<th>ADVANCE AND PROJECT PLANNING COSTS</th>
<th>TOTAL PROJECT COSTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove maintenance yard and back road to maintenance area, replace with gravel</td>
<td>127,234</td>
<td>24,281</td>
<td>151,515</td>
</tr>
<tr>
<td>Remove two nonhistoric maintenance buildings</td>
<td>25,676</td>
<td>4,900</td>
<td>30,576</td>
</tr>
<tr>
<td>Remove mid-1960s apartments and parking area</td>
<td>92,748</td>
<td>17,700</td>
<td>110,448</td>
</tr>
<tr>
<td>Remove playground, tennis court, and adjacent disturbed area</td>
<td>16,703</td>
<td>3,188</td>
<td>19,891</td>
</tr>
<tr>
<td>Reclaim above areas with native plants</td>
<td>13,401</td>
<td>2,558</td>
<td>15,959</td>
</tr>
<tr>
<td>Seal off water- and sewerlines in Caverns Historic District</td>
<td>25,414</td>
<td>4,850</td>
<td>30,264</td>
</tr>
<tr>
<td>Replace water- and sewerlines from restroom building</td>
<td>40,741</td>
<td>7,775</td>
<td>48,516</td>
</tr>
<tr>
<td>Rehabilitate existing headquarters building for environmental education building</td>
<td>1,454,755</td>
<td>277,625</td>
<td>1,732,380</td>
</tr>
<tr>
<td>Construct handicap accessible trail from environmental education building</td>
<td>103,490</td>
<td>19,750</td>
<td>123,240</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>2,262,789</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Alternative 2 Total**  
(for actions in “maximum relocation” scenario)  
**22,482,928**
### Table D-4: Alternative 3 — Construction Costs

<table>
<thead>
<tr>
<th>Action</th>
<th>Gross Construction Costs</th>
<th>Advance and Project Planning Costs</th>
<th>Total Project Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infrastructure Rehabilitation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace domestic water system</td>
<td>3,355,547</td>
<td>670,000</td>
<td>4,025,547</td>
</tr>
<tr>
<td>Replace or upgrade elevator structural members</td>
<td>1,300,000</td>
<td>271,000</td>
<td>1,571,000</td>
</tr>
<tr>
<td>Replace elevator tower roof</td>
<td>4,192</td>
<td>800</td>
<td>4,992</td>
</tr>
<tr>
<td>Repave existing entrance road (eligible for federal lands highway program funds)</td>
<td>3,423,816</td>
<td>653,400</td>
<td>4,077,216</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td>9,678,755</td>
</tr>
<tr>
<td><strong>New Off-Escarpment Orientation/Transit Center</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construct orientation/transit center</td>
<td>3,351,766</td>
<td>639,650</td>
<td>3,991,416</td>
</tr>
<tr>
<td>Construct access road and bridge</td>
<td>1,205,200</td>
<td>230,000</td>
<td>1,435,200</td>
</tr>
<tr>
<td>Construct paved parking for private vehicles, RVs, and buses</td>
<td>1,900,810</td>
<td>362,750</td>
<td>2,263,560</td>
</tr>
<tr>
<td>Install telephone, electrical, and water lines</td>
<td>87,152</td>
<td>16,632</td>
<td>103,784</td>
</tr>
<tr>
<td>Install sewage disposal pond</td>
<td>32,750</td>
<td>6,250</td>
<td>39,000</td>
</tr>
<tr>
<td>Landscape orientation/transit center with native plants, site work</td>
<td>1,543,180</td>
<td>294,500</td>
<td>1,837,680</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td>9,670,640</td>
</tr>
<tr>
<td><strong>New Off-Escarpment Park Operations Center</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construct headquarters/administration building</td>
<td>1,811,075</td>
<td>345,625</td>
<td>2,156,700</td>
</tr>
<tr>
<td>Construct dormitory for seasonal employees</td>
<td>1,310,000</td>
<td>250,000</td>
<td>1,560,000</td>
</tr>
<tr>
<td>Construct apartments for seasonal employees</td>
<td>806,960</td>
<td>154,000</td>
<td>960,960</td>
</tr>
<tr>
<td>Construct apartments for permanent employees</td>
<td>972,020</td>
<td>185,500</td>
<td>1,157,520</td>
</tr>
<tr>
<td>Construct duplexes and houses for permanent employees</td>
<td>5,841,290</td>
<td>1,114,750</td>
<td>6,956,040</td>
</tr>
<tr>
<td>Construct maintenance building</td>
<td>2,259,750</td>
<td>431,250</td>
<td>2,691,000</td>
</tr>
<tr>
<td>Construct paint storage building</td>
<td>94,320</td>
<td>18,000</td>
<td>112,320</td>
</tr>
<tr>
<td>Construct open maintenance garage</td>
<td>104,800</td>
<td>20,000</td>
<td>124,800</td>
</tr>
<tr>
<td>Construct maintenance parking/storage yard</td>
<td>235,800</td>
<td>45,000</td>
<td>280,800</td>
</tr>
<tr>
<td>Construct recreation/exercise building</td>
<td>425,750</td>
<td>81,250</td>
<td>507,000</td>
</tr>
<tr>
<td>Construct access road</td>
<td>2,656,051</td>
<td>506,880</td>
<td>3,162,931</td>
</tr>
<tr>
<td>Install sewer- and waterlines</td>
<td>574,094</td>
<td>109,560</td>
<td>683,654</td>
</tr>
<tr>
<td>Install electrical and telephone lines</td>
<td>21,442</td>
<td>4,092</td>
<td>25,534</td>
</tr>
<tr>
<td>Bury existing electrical and telephone lines</td>
<td>691,680</td>
<td>132,000</td>
<td>823,680</td>
</tr>
<tr>
<td>Landscape the above facilities with native plants, site work</td>
<td>2,665,693</td>
<td>508,720</td>
<td>3,174,413</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td>24,377,352</td>
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</table>
## Appendix D: Plan Phasing, Construction Costs, and Proposed Studies

<table>
<thead>
<tr>
<th>ACTION</th>
<th>GROSS CONSTRUCTION COSTS</th>
<th>ADVANCE AND PROJECT PLANNING COSTS</th>
<th>TOTAL PROJECT COSTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removal/Rehabilitation of Facilities at Cavern Entrance Area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rehabilitate historic structures in Caverns Historic District</td>
<td>2,452,320</td>
<td>468,000</td>
<td>2,920,320</td>
</tr>
<tr>
<td>Remove maintenance yard and back road to maintenance area, replace with gravel</td>
<td>127,234</td>
<td>24,281</td>
<td>151,515</td>
</tr>
<tr>
<td>Remove two nonhistoric maintenance buildings</td>
<td>25,676</td>
<td>4,900</td>
<td>30,576</td>
</tr>
<tr>
<td>Remove mid-1960s apartments, parking area</td>
<td>92,748</td>
<td>17,700</td>
<td>110,448</td>
</tr>
<tr>
<td>Remove playground, tennis court, and adjacent disturbed area</td>
<td>16,703</td>
<td>3,188</td>
<td>19,891</td>
</tr>
<tr>
<td>Reclaim above areas with native plants</td>
<td>13,401</td>
<td>2,558</td>
<td>15,959</td>
</tr>
<tr>
<td>Remove visitor center parking lots and reclaim with native plants</td>
<td>542,864</td>
<td>103,600</td>
<td>646,464</td>
</tr>
<tr>
<td>Remove asphalt pavement from historic parking area and repave with concrete</td>
<td>652,033</td>
<td>124,434</td>
<td>776,467</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td><strong>4,671,640</strong></td>
</tr>
<tr>
<td>Visitor Center Area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rehabilitate visitor center space for interpretive staff, essential maintenance functions, and remodel exhibit/lobby space</td>
<td>1,228,125</td>
<td>234,375</td>
<td>1,462,500</td>
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<tr>
<td>Remove unneeded portion of visitor center</td>
<td>44,802</td>
<td>8,550</td>
<td>53,352</td>
</tr>
<tr>
<td>Restore/replace visitor center exterior</td>
<td>139,384</td>
<td>26,600</td>
<td>165,984</td>
</tr>
<tr>
<td>Create new visitor center entrance</td>
<td>196,500</td>
<td>37,500</td>
<td>234,000</td>
</tr>
<tr>
<td>Construct shuttle turnaround/dropoff area</td>
<td>262,000</td>
<td>50,000</td>
<td>312,000</td>
</tr>
<tr>
<td>Redo visitor center site work and relandscape</td>
<td>39,300</td>
<td>7,500</td>
<td>46,800</td>
</tr>
<tr>
<td>Install system to treat water running off parking lots</td>
<td>131,000</td>
<td>25,000</td>
<td>156,000</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td><strong>2,430,636</strong></td>
</tr>
<tr>
<td>Cave Resource Actions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Install Lechuguilla Cave airlock</td>
<td>26,200</td>
<td>5,000</td>
<td>31,200</td>
</tr>
<tr>
<td>Replace trail in Carlsbad Cavern</td>
<td>2,720,608</td>
<td>519,200</td>
<td>3,239,808</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td><strong>3,271,008</strong></td>
</tr>
<tr>
<td><strong>Alternative 3 Total</strong></td>
<td></td>
<td></td>
<td><strong>54,100,031</strong></td>
</tr>
</tbody>
</table>
PROPOSED STUDIES, INVENTORIES, AND MONITORING ACTIVITIES

The following list does not include all studies that are discussed in the Resources Management Plan. Some studies are listed in both documents. The studies are listed in the order they are mentioned in the document.

Cave Studies
- Study methods to reduce cave resource impacts.
- Study the effects of the existing epoxy resin/emery chip trail surface, asphalt base, and hydrocarbon decomposition on the cavern environment.
- Undertake studies to determine how to modify trail cleaning and washing techniques to better contain contaminants and trail surface materials.
- Begin monitoring the effects of visitors in Slaughter Canyon Cave.
- Conduct a need assessment and feasibility study to determine the impacts of developing visitor access to Ogle Cave.

Natural Resource Studies
- Encourage additional studies of the fauna in the park's caves.
- Study the role of fire in the Chihuahuan Desert ecosystem.
- Conduct long-term monitoring of air, water, vegetation, and key wildlife species to discern long-term environmental quality trends.
- Conduct a parkwide survey for reptiles and amphibians.
- Study methods to improve habitat for bats and determine the feasibility of reintroducing bats.
- Study the effects of noise and vehicular activity on the bat flight.
- Conduct experiments to determine how the cave's lighting system affects cave swallows.
- Determine where cave swallows migrate in winter.
- Study ways to more effectively control non-native hoofed mammal species (such as Barbary sheep) in the park.
- Monitor small mammal populations in the park.
- Survey construction sites for threatened or endangered species.

Cultural Resource Studies
- Investigate archeological resources at all proposed sites where ground-disturbing activities are planned.
- Routinely monitor conditions of the park's archeological resources.
- Identify and inventory the park's paleontological specimens.
- Possibly upgrade the inventory of archeological resources in the Caverns Historic District to provide information about potentially sensitive areas.
- Inventory and evaluate Ogle Cave's historic resources for their national register significance as a precursor to a feasibility study about public access.
- Establish a parkwide monitoring program for archeological sites that could be threatened by vandalism or natural processes; also, monitor visitor access and activities to help ensure resource preservation.
- Determine the significance of water control features and other historic features at backcountry springs.
- Inventory and evaluate cultural resources along trails.
- Inventory and evaluate cultural resources in vicinity of cave openings.

Rattlesnake Springs Studies
- Monitor breeding birds at Rattlesnake Springs.
- Conduct a hydrologic study to learn more about groundwater flows that give rise to Rattlesnake Springs and of the springs' yield and quality under varying pumping and rain/drought conditions.
- Study potential adverse effects on the park's major underground water aquifer from irrigation runoff and leaks in nearby gas wells; also study how the park's overall water supply could be affected by excessive withdrawals from the aquifer outside the park;
and study the potential effect on the cultural landscape at Rattlesnake Springs.

- At Rattlesnake Springs, complete mapping of vegetation communities, conduct wildlife surveys and studies such as documenting and mitigating brood parasitism by cowbirds, and inventory prehistoric and historic archeological resources.

- Work cooperatively with the Rattlesnake Springs Nature Conservancy unit to determine and assess the historic/predrainage wetland configuration and to evaluate effects of meander channelization and other built features.

- Establish monitoring programs for both natural and cultural resources at Rattlesnake Springs.

**Visitor Use Studies**

- Conduct a carrying capacity study using the VERP process.

- Continue to evaluate the impacts of self-guided tours in Carlsbad Cavern.
APPENDIX E: SITING AND DESIGN GUIDELINES

SITE SELECTION RATIONALE
FOR AN NPS OPERATIONS AREA

Depending on the results of the infiltration/hazard study and a future decision, some park functions such as headquarters and administration, maintenance, and housing could be moved to a new operations area under the proposed action. The planning team considered a number of potential sites using suitability criteria such as potential risk to caves (known or unknown), proximity to the visitor center and cavern, landownership, views, and utility considerations. A potential site for relocating such facilities was identified east of the existing sewage lagoons at the base of the escarpment (see the Management Zoning map).

This site has a number of desirable characteristics. It is off the escarpment, where there is no risk of placing facilities above undiscovered caves. It is on NPS land within reasonable driving distance from the visitor center/cavern entrance area. It is large enough to permit expansion in the future, and there is room enough to locate structures away from drainages.

NPS facilities at this site would not be visible from the visitor center area, and they could be designed and constructed to blend into the background of the escarpment when seen from distant sections of U.S. 62/180. Views from the site would be good, and include the Guadalupe Mountains to the west, the undulating Chihuahuan Desert to the south, and the escarpment to the north. Only a few far-off stretches of U.S. 62/180 are visible; road noise would be minimal.

Facilities at this site could be tied into the existing sewage lagoons and the waterline from Rattlesnake Springs. Soils would present no serious problems for facility development; they have good bearing capacity and low shrink-swell potential. Slopes are gentle. Shallow soils over caliche and cemented gravel would make leveling land and installing underground utilities somewhat difficult but still feasible. The site could be reached in two different ways — from U.S. 62/180 and, if necessitated by an emergency, from the dirt road connecting it to Rattlesnake Springs (if fence gates are operational).

BLM land in the vicinity of Whites City may have many of the same desirable characteristics as the potential site described above. If it is decided to relocate NPS facilities off the escarpment, a lease or transfer of BLM land should also be considered. See the “Alternatives Considered but Rejected” section for information on other sites.

GENERAL DESIGN GUIDELINES

Sustainable design should provide the guiding principles for new facilities. Facility design should respect natural systems and reflect the cultural heritage of the Southwest. Architecture should mimic the low-profile, rustic stone or adobe architecture of the Caverns and Rattlesnake Springs Historic Districts. Structures should be oriented and designed for solar heat gain and wind cooling. Living and working spaces should be provided with overhangs or otherwise designed to be protected from summer sun. Buildings should have thick, well-insulated walls to help minimize the daily and seasonal temperature extremes of the desert. Facilities should incorporate other sustainable design practices, such as onsite energy production and storage, organic waste composting, rainwater collection and storage, water conservation, and the use of natural or recycled construction materials. Night lighting of facilities should be limited to the minimum necessary for safety; this would save energy and limit intrusion of light into the natural setting.

In the case of the Slaughter Canyon ranger residence, water would likely be provided by a new well. Wells and springs usually require the least energy, chemical, and financial input to provide safe water (NPS 1993b). Renewable energy sources, such as photovoltaic systems, could be used to pump water to a hillside storage reservoir for gravity distribution. A well is the most sustainable choice,
even if it must be several miles from the use point. A septic tank with a leachfield is the most likely means of water disposal (in combination with conservation measures such as low-volume flush toilets, fine-spray showerheads, and reuse of graywater); a typical family usually generates more wastewater than can be effectively disposed of through irrigation and other such means.

It might be possible to satisfy all of the energy requirements for the Slaughter Canyon ranger residence using independent sustainable energy sources. If so, the use of cellular phone service should be considered so that an underground utility trench would not be necessary. (The closest telephone and electrical service is about 1 mile away). If the residence did require commercial electrical service, electrical and telephone service could be extended to the site in the same underground trench.

In all park areas, existing topography should be used to separate uses and highlight desirable views where possible. Native plants should be used to define outdoor spaces and bring the natural environment into the built environment. For example, parking areas should incorporate planted islands, berms, and natural barriers. In areas where turf is required, native drought-tolerant grasses should be used.

During construction, earth grading and the alteration of natural drainage patterns should be minimized. Construction and staging zones should be carefully defined to minimize disturbance to native vegetation and soils; avoiding disturbance is much less expensive and more effective than restoration, especially in the desert. When disturbance cannot be avoided, foreign soils should not be brought in, and native plants should be replanted in disturbed soils. Native plants should be saved and nurtured for landscaping and disturbed areas restoration. When areas are replanted, care should be taken to copy native plant composition and distribution patterns.

There are several invasive weedy species that could be of concern when any sites were disturbed. Mitigation (pulling weeds and/or replanting) might be necessary. Invasive species include Malta starthistle (Centaurea melitensis), purple starthistle (Centaurea calcitrapa), yellow starthistle (Centaurea solstitialis), African rue (Peganum harmala), scotch thistle (Onopordum acanthium), jointed goatgrass (Aegilops cylindrica), and sandburs (Cenchrus spp.)

NPS designers, contractors, and park staff are urged to consult the following references for further information throughout the design process:

- “Impacts of Alternative 2 — Proposed Action” section of this document
- Guiding Principles of Sustainable Design (1993)
- Visual Quality of Built Environments in National Parks (1993)
- User Centered Design Institute Seminar Summary Notes (1993)
- NPS-76: Housing Design and Rehabilitation Guideline (1976, as amended)
- Sustainable Design and Construction Database, Denver Service Center
Goals for Visitor Center Redesign

1. Reduction in cross traffic
2. Reduction in queuing
3. Creation of a main circulation "spine" to improve movement to and through spaces
4. Clearer orientation to all building services and functions

Visitor Circulation Concept

Visitor Center Reorganization
Carlsbad Caverns National Park
United States Department of the Interior
National Park Service
DSC • July 1996 • 130 • 20,035
### APPENDIX G: NEW MEXICO SPECIES OF CONCERN

<table>
<thead>
<tr>
<th>Species Name</th>
<th>State Status</th>
<th>Occurrence in Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenthroat darter (<em>Etheostoma lepidum</em>)</td>
<td>Endangered</td>
<td>Rattlesnake Springs</td>
</tr>
<tr>
<td>Mottled rock rattlesnake (<em>Crotalus lepidus lepidus</em>)</td>
<td>Endangered</td>
<td>Several canyons</td>
</tr>
<tr>
<td>Bell’s vireo (<em>Vireo bellii</em>)</td>
<td>Endangered</td>
<td>Rattlesnake Springs</td>
</tr>
<tr>
<td>Gray vireo (<em>Vireo vicinior</em>)</td>
<td>Endangered</td>
<td>Parkwide</td>
</tr>
<tr>
<td>Varied bunting (<em>Passerina versicolor</em>)</td>
<td>Endangered</td>
<td>Rare parkwide</td>
</tr>
<tr>
<td>Giant helleborine orchid (<em>Epipactis gigantia</em>)</td>
<td>Endangered</td>
<td>Status not known</td>
</tr>
<tr>
<td>Button cactus (<em>Epithelantha micromeris</em>)</td>
<td>Endangered</td>
<td>Status not known</td>
</tr>
<tr>
<td>Guadalupe milkwort (<em>Polygala rimulicola var. rimulicola</em>)</td>
<td>Endangered</td>
<td>Status not known</td>
</tr>
<tr>
<td>Pecos gambusia (<em>Gambusia nobilis</em>)</td>
<td>Endangered (also federal endangered)</td>
<td>Not known in park but has occurred in vicinity</td>
</tr>
<tr>
<td>Variegated vertigo (<em>Vertigo ovata</em>)</td>
<td>Endangered (also federal category 2)</td>
<td>Not known in park but has occurred in vicinity</td>
</tr>
<tr>
<td>Mexican tetra (<em>Astyanax mexicanus</em>)</td>
<td>Endangered</td>
<td>Not known in park</td>
</tr>
<tr>
<td>Rio Grande river cooter (<em>Pseudemys concinna</em>)</td>
<td>Endangered</td>
<td>Not known in park</td>
</tr>
<tr>
<td>Blotched water snake (<em>Nerodia erythrogaster</em>)</td>
<td>Endangered</td>
<td>Not known in park</td>
</tr>
<tr>
<td>Chapline’s columbine (<em>Aquilegia chrysanthia var. chaplinei</em>)</td>
<td>Endangered</td>
<td>Not known in park</td>
</tr>
<tr>
<td>Scheer’s pincushion cactus (<em>Coryphantha scheeri var. valida</em>)</td>
<td>Endangered</td>
<td>Not known in park</td>
</tr>
<tr>
<td>McKittrick pennyroyal (<em>Hedeoma apiculatum</em>)</td>
<td>Endangered</td>
<td>Not known in park</td>
</tr>
<tr>
<td>Mountain lily (<em>Lilium philadelphicum var. andinum</em>)</td>
<td>Endangered</td>
<td>Not known in park</td>
</tr>
<tr>
<td>Visnagita cactus (<em>Neolloydia intertexta var. intertexta</em>)</td>
<td>Endangered</td>
<td>Not known in park</td>
</tr>
<tr>
<td>Guadalupe penstemon (<em>Penstemon cardinalis ssp. regalis</em>)</td>
<td>Rare and sensitive*</td>
<td>Status not known</td>
</tr>
<tr>
<td>Superb penstemon (<em>Penstemon superbus</em>)</td>
<td>Rare and sensitive*</td>
<td>Status not known</td>
</tr>
<tr>
<td>Hitchcock’s mockorange (<em>Philadelphus hitchcockianus</em>)</td>
<td>Rare and sensitive*</td>
<td>Status not known</td>
</tr>
<tr>
<td>Supreme sage (<em>Salvia summa</em>)</td>
<td>Rare and sensitive*</td>
<td>Status not known</td>
</tr>
<tr>
<td>Guadalupe jewelweed (<em>Streptanthus sparsiflorus</em>)</td>
<td>Rare and sensitive*</td>
<td>Status not known</td>
</tr>
<tr>
<td>Waterfall milkvetch (<em>Astragalus waterfallii</em>)</td>
<td>Rare and sensitive*</td>
<td>Not known in park</td>
</tr>
<tr>
<td>Smooth cucumber (<em>Sicyos glaber</em>)</td>
<td>Rare and sensitive*</td>
<td>Not known in park</td>
</tr>
<tr>
<td>Guadalupe mesquite bean (<em>Sophora gysophila var. guadalupensis</em>)</td>
<td>Rare and sensitive*</td>
<td>Not known in park</td>
</tr>
<tr>
<td>Havard’s gumweed (<em>Grindelia havardii</em>)</td>
<td>Review list**</td>
<td>Status not known</td>
</tr>
<tr>
<td>Mexican eared fern (<em>Phanerophlebia auriculata</em>)</td>
<td>Review list**</td>
<td>Not known in park</td>
</tr>
<tr>
<td>Resurrection plant (<em>Selaginella pilifera</em>)</td>
<td>Review list**</td>
<td>Status not known</td>
</tr>
<tr>
<td>Palma (<em>Yucca faxoniana</em>)</td>
<td>Review list**</td>
<td>Not known in park</td>
</tr>
</tbody>
</table>

* Rare and sensitive — Restricted distribution or low numerical density; these species are not protected by state statute but are monitored by the state.

** Review list — Like the federal category 2 candidate species, these species might warrant protection but not enough information is known. Currently they are not protected under state statute.
APPENDIX H: ELEVATOR CAPACITY

Main Cavern Daily Capacity

Four elevators allow access to the main cavern for visitors and staff. Two elevators have a capacity of 20 persons per trip, and two 10 persons per trip. A round-trip takes 5 minutes. Therefore, the hourly capacity of the four elevators is 720 people:

\[((2 \text{ elevators} \times 20 \text{ people/elevator}) + (2 \text{ elevators} \times 10 \text{ people/elevator})) \times ((60 \text{ minutes/hour}) / (5 \text{ minutes/trip})) = 720 \text{ people/hour}\]

During an 8-hour workday, 5,760 persons can be served. A 10-hour workday raises the daily capacity to 7,200 persons.

Main Cavern Monthly Capacity

The monthly capacity of the elevators is 172,800 persons for a 30-day month and 8-hour workdays:

\[(5,760 \text{ persons/day} \times 30 \text{ days/month}) = 172,800\]

The capacity is 216,000 for a 30-day month and 10-hour workdays:

\[(7,200 \text{ persons/day} \times 30 \text{ days/month}) = 216,000\]

Main Cavern Annual Capacity

Annual elevator capacity for 8-hour workdays is 2,096,640 persons:

\[(5,760 \text{ persons/day} \times 364 \text{ days/year}) = 2,096,640\]

Annual elevator capacity for operating on a 10-hour workday schedule is 2,620,800 persons:

\[(7,200 \text{ persons/day} \times 364 \text{ days/year}) = 2,620,800\]

Other Caves

Use of Slaughter Canyon Cave is limited because tours depend on park staff being available. Two guided tours per day are offered. The number of visitors per tour is limited to 25. So the maximum number of visitors that can be served is 350 per week:

\[((25 \text{ people/tour} \times 2 \text{ tours/day}) \times 7 \text{ days/week}) = 350 \text{ people/week}\]

These tours are available every day of the week during the summer and on weekends the rest of the year. Thus, the present capacity is approximately 8,750 per year:

\[((25 \text{ people/tour} \times 2 \text{ tours/day}) \times 175 \text{ days/year}) = 8,750 \text{ people/year}\]

This capacity could be increased by offering tours on more days.

In 1989 visitor use data for caves (wild caves) other than the main cavern or Slaughter Canyon Cave were begun to be kept separately. In prior years this visitor use information was combined with backcountry use. Use of these other caves is growing.
APPENDIX I: MONEY GENERATION MODEL

The money generation model was developed by the Socio-Economic Studies Division of the National Park Service. This model is designed to estimate the economic benefits attributable to the existence of a park in a local area. It is inexpensive and relatively simple to use, and it provides conservative estimates of the economic impacts of a park on a local economy.

The model is predicated on visitor data and park expenditure data. As is true of all models, the output is only as valid and reliable as the data that are input. It provides estimates of how tourist expenditures, federal government expenditures, and expenditures by other outside parties benefit three components of the local area economy.

- The first component, increased sales, is a measure of additional purchases of goods and services within the local economy.
- The second component, additional taxes, is a measure of increased sales tax and income tax revenues.
- The final component is a measure of the number of jobs created or supported by the park’s existence.

It is assumed in this model that 30 jobs are created for each $1 million of increased sales attributed to the park. No attempt is made to differentiate between full- and part-time employment in this model. Also, although these jobs owe their existence to the park, obviously some businesses may have a substantial non-park clientele.

It is estimated that in 1993 Carlsbad Caverns National Park contributed over $26 million in additional sales, $1.8 million in additional taxes, and supported approximately 785 jobs within the local economy (table I-1).

<table>
<thead>
<tr>
<th>Combined Benefits Due To:</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased Sales</td>
<td>$26,180,800</td>
</tr>
<tr>
<td>Additional Taxes</td>
<td>$1,855,600</td>
</tr>
<tr>
<td>Jobs Created/Supported</td>
<td>785</td>
</tr>
</tbody>
</table>

Source: National Park Service, Denver Service Center, Central Team, Branch of Planning

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### Table I-2: Data Used in the Money General Model

<table>
<thead>
<tr>
<th>Data Item</th>
<th>Data Value</th>
<th>Source of Data Value</th>
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<tr>
<td>Nonlocal Percent of Park Use</td>
<td>0.9</td>
<td>Carlsbad Caverns National Park</td>
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<tr>
<td>Recreation Visitor Days</td>
<td>203885</td>
<td>National Park Service Statistical Abstract 1993</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Socio-Economic Studies Division</td>
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<tr>
<td>Average Daily Expenditures per Person</td>
<td>$51.73</td>
<td>1992 American Automobile Association</td>
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<tr>
<td>Indirect &amp; Induced Sales Multiplier</td>
<td>2</td>
<td>Money generation model</td>
</tr>
<tr>
<td>Combined State &amp; Local Sales Tax Rate</td>
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<td>Carlsbad Caverns National Park</td>
</tr>
<tr>
<td>Taxable Income Ratio</td>
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<td>Money generation model</td>
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<td>Combined State &amp; Local Income Tax Rate</td>
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<td>Job Creation Multiplier</td>
<td>30</td>
<td>Money generation model</td>
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<td>Federal Government Expenditures</td>
<td>$3,599,500</td>
<td>Carlsbad Caverns National Park (FY 1994 budget)</td>
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<tr>
<td>Indirect &amp; Induced Government Sales Multiplier</td>
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<td>Money generation model</td>
</tr>
<tr>
<td>Other Nonlocal Parties' Expenditures</td>
<td>$0.00</td>
<td>unknown</td>
</tr>
</tbody>
</table>

Sources: BLM 1993; Gramann et al. 1989.
Memorandum

To: Acting Superintendent, National Park Service, Carlsbad Caverns National Park, Carlsbad, New Mexico

From: Field Supervisor, U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office, Albuquerque, New Mexico

Subject: Revised Draft General Management Plan/Environmental Impact Statement for Carlsbad Caverns National Park

This responds to your memorandum dated November 3, 1995, requesting review of the subject document and concurrence with your finding that the proposed action is "not likely to adversely affect" any species that are proposed or listed as endangered or threatened.

We have reviewed the revised draft plan and have no additional comments. The U.S. Fish and Wildlife Service concurs with the National Park Service finding that under the procedures indicated in the plan, the proposed action is "not likely to adversely affect" any species proposed or listed as threatened or endangered.

For further communication on this revised draft plan/environmental impact statement, refer to consultation #2-22-93-I-088. If we can be of further assistance, please contact Charlie McDonald of my staff at (505) 761-4525.

[Signature]

Jennifer Fowler-Propst
July 18, 1995

United States Department of the Interior
NATIONAL PARK SERVICE
Intermountain Field Area
Intermountain Cultural Resource Center
P. O. Box 728
Santa Fe, NM 87504-0728

RE: H30(INTM-ICH)

Dear Ms. Mitchell:

Thank You for the opportunity to review the draft General Management Plan Environmental Impact Statement for Carlsbad Caverns National Park. We have no comments at this time, but look forward to reviewing individual undertakings carried out under this plan in our Section 106 consultations.

Sincerely,

Michael Romero Taylor
State Historic Preservation Officer

MRT/bo
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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.