United States Department of the Interior
NATIONAL PARK SERVICE
CORONADO NATIONAL MEMORIAL
4101 E. Montezuma Canyon Road
Hereford, Arizona 85615

IN REPLY REFER TO :

L7615

March 26, 2004

Dear Friends of Coronado National Memorial:

The enclosed Final General Management Plan/Environmental Impact Statement for Coronado National Memorial represents the culmination of four years of planning for the future of the park. We officially began the process on February 22, 2000 with a notice in the *Federal Register* announcing the intent to produce a general management plan and accompanying environmental impact statement. A news release went out to local and regional outlets shortly thereafter. Public scoping meetings began in April of that year to gather public perspectives and expectations for the national memorial as well as to collect ideas for future management, development, and interpretation.

A draft plan was written and placed on 60-day public review in August 2003. A public meeting was held in Sierra Vista to discuss the plan during the review period. Comments were received from individuals, government agencies, and organized interest groups. Many of these comments are reflected in this final plan.

Although technically not on review, this plan cannot be finalized for the next 30 days. This is so the public, organizations, and government agencies may look at the document and notify the National Park Service of any legal insufficiencies. Following that 30-day period, the Intermountain Regional Director of the National Park Service will sign a Record of Decision, which marks the end of the general management planning process.

We are very pleased to have this plan completed. It will provide the framework for management and development at Coronado National Memorial in the coming years. Thank you for your participation in the planning process.

Sincerely,

Dale Thompson

DaleThompson
Superintendent

United States Department of the Interior
National Park Service

Coronado National Memorial
Arizona

Coronado National Memorial
Arizona

Final General Management Plan / Environmental Impact Statement

General Management Plan / Environmental Impact Statement
CORONADO NATIONAL MEMORIAL

Cochise County, Arizona

January 2004

This *General Management Plan / Environmental Impact Statement* describes five alternatives for the future management of Coronado National Memorial. The approved plan will establish a direction for guiding the memorial for the next 15 to 20 years. Some issues to be addressed are relations with Mexico, helping visitors understand the memorial's context within the region and the significance of the Coronado Expedition, livestock grazing in the memorial, preserving cultural landscapes, and ensuring efficiency and sustainability in developments.

Alternative A, the no-action alternative would continue the current management. It forms a basis for comparing and evaluating the other alternatives. Visitor and staff facilities would be little changed under this alternative. The memorial would work with Mexico to develop interpretive programs. Livestock grazing would continue in the memorial's two leased grazing allotments following the guidance in the memorial's "Livestock Management Plan." In **alternatives B and C,** grazing in the memorial would be ended. In **alternative B, the preferred alternative,** the visitor center would be rehabilitated, with an annex added for more office space and storage. New trails would be developed, and pullouts and waysides would be added to roads. Programs would help visitors understand the Coronado Expedition and its impact on the American Southwest. In **alternative C,** the focus would be on conserving cultural and natural resources. The visitor center's interior would be remodeled to make more space for interpretation. In **alternative D,** the memorial's international aspects would be emphasized. A structure would be built to commemorate the Coronado Expedition, and an educational center would be developed in the Montezuma Ranch area. The visitor center would be expanded and rehabilitated. Grazing would continue in the Joe's Spring allotment but not in the Montezuma allotment. The visitor experience would be enhanced in **alternative E** by a new visitor/educational center, to which visitors could drive on a paved two-lane road and enjoy a panoramic view of the San Pedro River Valley and the United States–Mexico border. The visitor center would be converted into administrative offices. Grazing would be eliminated from the Joe's Spring allotment.

The potential environmental consequences of each alternative are described in this document. In **alternative A,** continued use of roads and trails would degrade soils, vegetation, and water quality. Continued crowding at the visitor center would continue to adversely affect interpretation and orientation. Livestock would continue to trample soils and consume vegetation even though this is being reduced by the memorial's "Livestock Management Plan." Continuing grazing in one allotment in **alternatives D and E** would cause similar effects, but the area grazed in those alternatives would be reduced by 14% and 25%, respectively. In **alternative B,** building the visitor center annex, parking areas, trails, pullouts, and waysides, would disturb soils and vegetation and agitate small mammals, amphibians, and reptiles. The annex would decrease congestion and allow better displays for interpretation, furthering visitor understanding. In **alternatives B and C,** ending grazing would stop conflicts between visitors and livestock, reduce soil erosion and compaction, prevent livestock damage of archeological resources, and improve bird nesting habitat and riparian habitat. Developments in **alternative C** would disturb soils and vegetation. Restoring views to those that existed at the time of the Coronado Expedition would benefit cultural landscapes. In alternatives **C and D,** access to the grasslands would be improved by closing one grazing allotment. In **alternative D,** expanding the visitor center would cause runoff and erosion, harming soils and vegetation. This would be temporary and controlled. Widening and paving East Forest Lane would remove riparian vegetation in a small area. Adapting the Montezuma Ranch structures to use as the educational center would adversely affect soils, vegetation, sensitive species, and water quality. The commemorative feature would enhance visitors' understanding of the memorial. In **alternatives D and E,** more roads, trails, and facilities could harm cultural landscapes. Ending grazing in one allotment would adversely affect individual ranchers, but the effect on the local economy would be negligible. Building a visitor center under **alternative E** would harm soils, vegetation, and wildlife habitat in a mostly previously undisturbed area. Runoff from added parking and the widened, paved Windmill Road would adversely affect soils, vegetation, sensitive species, and water quality. The new visitor center would reduce congestion, enriching interpretation, and the panoramic view from there would improve visitors' understanding of Coronado National Memorial.

This document will be on review for 30 days following the publication of the notice of availability in the *Federal Register*. Following a 30-day no-action period, the Intermountain Regional Director of the National Park Service will sign a Record of Decision, which marks the end of the general management planning process. For questions or comments, write to Superintendent, Coronado National Memorial, 4101 East Montezuma Canyon Road, Hereford, AZ 85615, or telephone 520-366-5515.

SUMMARY

The purpose of this *General Management Plan / Environmental Impact Statement* is to define a direction for the management of Coronado National Memorial for the next 10 to 15 years. The approved plan will provide a framework for making decisions about the future direction for the management and use of Coronado National Memorial. It will establish a management philosophy and framework for decision making and problem solving so that future opportunities and problems can be addressed effectively. The plan will prescribe the resource conditions and visitor experiences to be achieved over time according to law, policy, regulations, and public expectations within the context of the memorial's purpose, significance, and mission.

The memorial was established as a unit of the national park system to commemorate and interpret Francisco Vásquez de Coronado's 16th-century expedition into what is now the United States. The memorial's southern boundary is on the border between the United States and Mexico. It offers extraordinary views of the San Pedro River Valley, and the National Park Service has an opportunity to interpret for visitors the first major exploration by Europeans into the American Southwest.

ISSUES TO BE ADDRESSED

A plan is needed to address issues related to international significance, cultural landscapes, interpretation, orientation, facility development, and livestock management.

- Illegal immigration through the memorial and illegal trafficking in drugs adversely affect resources and the visitor experience.
- The memorial's cultural landscape is gradually being eroded by modern intrusions.
- The visitor center / headquarters building, the maintenance facilities, and staff housing are inadequate, and NPS managers must decide what facilities are necessary for future visitor experiences and resource protection.
- Two areas in the memorial now leased for livestock grazing may contribute to conflicts between ranching and recreational uses.
- Public involvement is needed to maximize services for visitors and to offset the effect of overextended NPS funding and staff. Public and private groups must be encouraged to help in the memorial's mission.

ALTERNATIVES

To achieve the desired conditions in Coronado National Memorial, the planning team developed a "no-action" alternative (continuing present management) and four "action" alternatives for managing the memorial's resources and uses. After the action alternatives were formed, the team created management prescriptions (zones) that would apply — although differently — to each action alternative. Four management prescriptions were established: conservation, education, visitor services, and operations / special use. Each prescription area could have a particular combination of resource conditions, visitor understanding, facilities, and activities. Each alternative would involve different configurations of these prescriptions. The management prescriptions for each alternative are clarified in table 1 (p. 37); the alternatives are compared in table 8 (p. 77).

Alternative A: Existing Management Direction (No Action)

Alternative A, the no-action alternative, represents the existing conditions at the national memorial. This alternative is presented as a way of comparing current conditions to possible future conditions, as proposed by the four "action" alternatives. Under alternative A the current management direction would continue with no significant change in interpretation or management, and the staff would continue to work in overcrowded conditions with limited storage space. Interpretive themes would be equally emphasized. The memorial would work with Mexico to develop interpretive programs.

Cultural and natural resources would be managed, protected, and maintained as staff time and funding allowed, and inventories and monitoring would be expanded if possible. There would be no management prescriptions in alternative A.

In alternative A, as in all the alternatives, the recently acquired Montezuma Ranch, which is in the grasslands south of the main memorial road, would be evaluated for eligibility for listing on the National Register of Historic Places. In alternatives A, B, C, and E, the memorial staff then would work toward removing the early 20th century ranch structures to improve the views. If any structures were found eligible for the national register, the staff would consult with the Arizona state historic preservation office to determine what features could be removed, or documented and then removed. The goal would be to remove as many of these nonhistoric features as possible. The natural contours of the area would then be restored, and the area would be revegetated with native plant species.

The Joe's Spring and Montezuma grazing allotments would continue to be managed according to the *Livestock Management Plan* (NPS 2000b). This would include the eventual retirement of one or both allotments if the permittees were willing. The memorial would continue existing partnering agreements for the provision of law enforcement, communications, and fire protection, as well as working with schools and other organizations to interpret the area's cultural heritage and ecosystems.

Alternative B: Enhance Opportunities While Protecting Resources (Preferred Alternative)

The concept of alternative B, the alternative preferred by the National Park Service, would be to enhance educational and recreational opportunities while protecting, perpetuating, and ensuring public understanding of the national memorial's resources. Educational and interpretive goals would be emphasized, and the staff would seek new ways to foster public appreciation of the memorial's resources.

All lands not included in other prescriptions would be in the **conservation prescription.** Grazing in the national memorial would be discontinued, and the abandoned powerline along the road to Montezuma Pass would be removed and revegetated with native plant species. All existing trails would be retained, and four new trails would be developed (locations described below for the education prescription). Some trails would be in the former grazing allotments.

The **education prescription,** in which interpretation would be intensive, would be applied to the trail from Montezuma Pass to Coronado Peak, the trail to Coronado Cave, and the grasslands north and south of the main road. The Montezuma Ranch, which is in the grasslands, would be managed as described in the discussion of alternative A. A loop trail would be developed in the grasslands south of the main road. A trail accessible for people with disabilities would be developed in the grasslands north of the entrance, using part of Windmill Road.

The **visitor services prescription** would contain the area around the visitor center,

parking atop Montezuma Pass, and the main road. Another trail would be added between the visitor center and the entrance. The rehabilitated visitor center would offer updated interpretation. Interpretation also would be available at Montezuma Pass. More pullouts and waysides would be developed along the main road. An annex behind the visitor center would contain additional office space and storage, along with a multipurpose room. To add the annex, the interpretive trail outside the visitor center would have to be removed, but a new interpretive trail accessible for people with disabilities would be developed near the current picnic area. Staff and visitors could park in the current picnic area.

A new group picnic area would be placed near the site of the old fiesta area. The visitor shelter at Montezuma Pass would be converted into a minimal contact station (staffed at peak times); at some later time it might become a sheltered shuttle stop. The interpretive media at this site would be updated.

The **operations / special use prescription** would contain the current staff housing, the maintenance area, private inholdings, and a utility corridor. A new four-unit structure might be added to house temporary employees and others at the memorial temporarily. All development would be screened from the road by vegetation.

To encourage better public understanding of its mission, the national memorial would work toward creating an offsite cultural festival to celebrate various associated cultures, emphasizing the historical aspects of the Coronado Expedition. To help visitors understand the memorial's story, the staff would promote special events inside and outside the memorial, such as programs highlighting the Coronado Expedition, its legacy, and its impact on the present American Southwest. The memorial would support the preservation of the regional ecosystem, possibly working with partners to preserve the views of the San Pedro Valley from Montezuma Pass.

Alternative C: Focus on Resource Protection While Fulfilling the Memorial's Mission

The concept of alternative C would be to focus on conserving the memorial's cultural and natural resources for future generations. Intrusive features on the landscape would be minimized, interpretation would be updated, and the outreach program would be assertive.

All lands in the memorial not included in other prescriptions would be placed in the **conservation prescription.** The abandoned powerline along the Montezuma Pass road would be removed and revegetated with native species. Studies would be done to determine the feasibility of reintroducing native plants and animals in the memorial that were present at the time of the Coronado Expedition. Grazing would be eliminated from the national memorial. The Montezuma Ranch would be managed as described in the discussion of alternative A, page vi. Abandoned roads would be restored to natural contours and revegetated.

The **education prescription** would include the trail from Montezuma Pass to Coronado Peak and the trail to Coronado Cave. More intensive interpretation would be offered in both areas.

The **visitor services prescription** in alternative C would encompass the area around the visitor center, the picnic area, parking atop Montezuma Pass, and the main road. The interior of the visitor center would be remodeled to make more space for interpretation. The building would be evaluated for its eligibility for national register listing, and any work would be planned to protect the contributing features. The interpretive trail near the visitor center would be made accessible for people with disabilities.

Some staff positions would be relocated in adequate space outside, but near, the memorial to make room for visitors to park at the visitor center. The picnic area and its access road would be retained, with parking added nearby for four buses or recreational vehicles. The dirt storage area on the road to Montezuma Pass would be removed, and that area, along with the former fiesta grounds and social trails, would be restored to natural contours and revegetated.

The **operations / special use prescription** in alternative C would comprise the staff housing, the maintenance area, private inholdings, and a utility corridor. A new four-unit structure might be built to house temporary employees and others at the memorial temporarily. Vegetation would screen all development from the road.

Strong emphasis would be placed on reaching beyond the memorial's boundaries to improve public understanding of the national memorial. The staff would join forces with various groups to tell the memorial's story. Interpretive programs would be developed with Mexican groups, and activities could support Mexican and American natural and cultural resources. The memorial would support the preservation of the regional ecosystem, possibly working with partners to preserve the views of the San Pedro Valley from Montezuma Pass.

Alternative D: Create an International Experience for Visitors

The concept of alternative D would be to develop a fuller international experience for visitors by finding new ways for the public to appreciate and understand the international aspects of the memorial.

The **conservation prescription** in alternative D would contain all lands not included in other prescriptions. The abandoned powerline along the Montezuma Pass road would be removed and the area revegetated with native species. Abandoned roads would be restored to natural contours and revegetated. Grazing would not be permitted in the Montezuma allotment.

In the **education prescription** would be the trail from Montezuma Pass to Coronado Peak (with updated interpretive media), the trail to Coronado Cave (with added interpretive media), and the grasslands north of the main road. Part of the trail to Coronado Peak might be made accessible for visitors with disabilities. A new interpretive trail would be developed north of the main road in the grasslands, possibly using Windmill Road, but not going into the Joe's Spring allotment.

The **visitor services prescription** would consist of the area around the visitor center, the picnic area, parking atop Montezuma Pass, the main road, East Forest Lane from the main road to the border, and the Montezuma Ranch area. East Forest Lane would be upgraded to two lanes, and a new structure would be built at the end of that road to offer shelter from weather and views into Mexico. In this commemorative feature, which could become a main attraction of the memorial, interpretive media would foster understanding and appreciation through a historical perspective of the region as illustrated by the Coronado Expedition, encouraging international amity.

An educational center with space for staff offices would be built in the Montezuma Ranch area. The center would be designed to blend into the environment, with the surrounding area landscaped so that it would not detract from the views from Coronado Peak. The Montezuma Ranch structures would be evaluated for national register eligibility. The structures found ineligible would be demolished. If any structures were found eligible for the national register, the staff would consult with the Arizona state historic preservation office to determine what features could be removed, adaptively used, or documented and then removed. Any

structures found eligible might be adaptively used as part of the educational center.

The views from Montezuma Pass would be preserved, with the roads to the educational center and the commemorative feature designed to minimize harm to the vista. The visitor center would be expanded and rehabilitated, with updated interpretation and more office and storage space. Interpretative themes would relate to the memorial's international aspects.

The interpretive trail at the visitor center would be removed. The visitor center would be evaluated for national register eligibility, and any work would be planned to protect the contributing features. More parking for visitors and NPS staff would be added; some could be in the present picnic area. The road to the picnic area would be upgraded and picnic sites added. The visitor shelter at Montezuma Pass would be converted into a minimal contact station (staffed at peak times); at some later time it might become a sheltered shuttle stop.

The **operations / special use prescription** in alternative D would contain the staff housing, the maintenance area, private inholdings, and a utility corridor. A new four-unit structure might be built to house temporary employees and others at the memorial. All development would be screened from the road by vegetation.

The memorial would explore the feasibility of sponsoring Coronado-related events at various universities to promote international understanding. These events might include onsite or offsite lectures and cultural activities. In addition, The memorial would support the preservation of the regional ecosystem, possibly working with partners to preserve the views of the San Pedro Valley from Montezuma Pass.

Alternative E: Enhance Interpretation and the Efficiency of Operations

The concept of alternative E would be to offer an enhanced experience for visitors while creating a more sustainable national memorial and seeking new ways to educate the public about the significance of the Coronado Expedition. A new visitor/educational center would be created, and a new interpretive trail would be developed.

The **conservation prescription** would contain all lands not included in other prescriptions. The abandoned powerline along the road to Montezuma Pass would be removed and the area revegetated with native species. Grazing in the Joe's Spring allotment would be ended. East Forest Lane would continue to be used for NPS operations and as an access road to the Montezuma grazing allotment. The Montezuma Ranch would be managed as described in the discussion of alternative A, page vi.

The **education prescription** in alternative E would consist of the trail from Montezuma Pass to Coronado Peak, the trail to Coronado Cave, and the grasslands north of the main road. The interpretive media on both trails would be updated. Another trail would be added between the visitor center and the entrance.

The **visitor services prescription** would contain the present visitor center, the picnic area, the parking atop Montezuma Pass, the main road, part of Windmill Road, and the new visitor/educational center, which would be about 1.2 miles west of the east entrance. A trail would be developed at that center to interpret the grasslands, and another trail would be created between the current visitor center and the new visitor and educational center. From the new center, visitors would have panoramic views of the San Pedro River Valley and the United States–Mexico border. These views would add to the staff's ability to tell the human and natural history stories significant to Coronado National Memorial.

The principles of sustainable design would be used to create this building typical of the Spanish colonial period, which would blend into the environment as much as possible.

The present visitor center, which may be eligible for national register listing, would be converted into administrative offices. It would be evaluated for national register eligibility, and any work done on the building would be planned to protect the eligible features. The main road, trailheads, parking, picnic area, and restrooms would be unchanged, with social trails revegetated. Windmill Road would be made into a two-lane paved road, with the alignment changed slightly to give access to the visitor/educational center. The visitor shelter at Montezuma Pass would be converted into a minimal contact station and possibly, at a later date, a sheltered shuttle stop.

The **operations / special use prescription** would include the staff housing, the maintenance area, private inholdings, and a utility corridor. A new four-unit structure might be added to house temporary employees and others temporarily staying at the memorial. All development would be screened from the road by vegetation.

All interpretive themes would be equally emphasized in alternative E, with strong importance given to working with various groups to tell the memorial's stories and reach beyond its boundaries. Partnerships would be created with local schools, the U.S. Forest Service, the Bureau of Land Management, and others, and interpretive programs would be developed in conjunction with Mexican groups.

The memorial would support the preservation of the regional ecosystem, possibly working with partners to preserve the views of the San Pedro Valley from Montezuma Pass.

ENVIRONMENTAL CONSEQUENCES

The planning team evaluated the potential consequences that the actions of each alternative would have on natural resources, cultural resources, visitor understanding and recreational resources, and the socioeconomic environment. The beneficial or adverse effects were categorized as either short term or long term, and their intensity was rated as negligible, minor, moderate, or major. The impacts of the alternatives are compared in table 9 (p. 77).

Effects from Alternative A

Natural Resources. Long-term local negligible to minor adverse effects on ***soils*** and ***vegetation*** would be caused by human activity at developed sites and along trails, the ongoing maintenance of existing structures and roads, and the rehabilitation of existing structures as funds permitted. The associated ground disturbance could encourage invasive nonnative plant species to increase. Removing the Montezuma Ranch structures would cause trampling and the uprooting of vegetation, a short-term negligible to minor local adverse effect on about 5 acres of soils and vegetation (less than 1% of the memorial's total acreage). Revegetating the area after the structures were removed would restore the overall integrity of the vegetative community. Minor adverse effects on soils and vegetation (which stabilizes soils) would continue in the grazing allotments from erosion and compaction by cattle hooves. However, implementation of the new *Livestock Management Plan* is reducing stocking levels and modifying the season of use, allowing native grass species to increase and improving range condition. These long-term beneficial effects on soils and vegetation would be negligible to minor.

Developing a fire management plan would reduce hazardous fuels, diminishing the potential for wildland fire in the memorial and beyond its boundaries.

Threatened, endangered, or sensitive species would not be adversely affected by alternative A. Removing the Montezuma Ranch structures and restoring and revegetating the area would result in more agave plants, increasing the available food for nectar-feeding bats. It also would increase the habitat available for small rodents and insects, an negligible to minor beneficial effect on the loggerhead shrike.

Water quality in Coronado National Memorial would continue to be adversely affected by the use of current trails, roads, and facilities adjacent to drainages, which would make streambanks unstable. Maintaining and using existing structures might cause the loss of riparian vegetation in small areas through trampling and uprooting. The long-term adverse effects on wetlands from these causes would be negligible. The short-term adverse effect on water quality from removing the Montezuma Ranch structures would be negligible because it would not be near drainages, and mitigative measures would reduce soil erosion. Restoring and revegetating the area after building removal would reduce compaction and wind erosion.

Grazing, even at reduced levels under the *Livestock Management Plan*, would continue to degrade watersheds, causing soil erosion, reduced plant cover, and altered plant communities. However, sedimentation, fecal coliform, and other microbes would decrease, and the effects on grazing in riparian areas would be reduced. The long-term adverse impacts on water quality and riparian areas from continued grazing would be minor.

Removing the Montezuma Ranch structures and restoring and revegetating the area would improve grassland habitat, benefiting ***wildlife*** and giving small rodents more habitat, but removing the structures would result in long-term negligible adverse effects on wildlife. Mitigating measures would reduce the effects on rare or uncommon wildlife species. Continued management of grazing according to the *Livestock Management Plan* would improve small mammal habitat and bird nesting habitat. Continued grazing would reduce forage and cause habitat loss, a minor long-term adverse impact on wildlife.

Cultural Resources. An archeological survey of the Montezuma Ranch would be completed, and any ***archeological resources*** found there would be preserved in place, a negligible long-term beneficial effect. Archeological sites have been damaged by livestock grazing. The continued disturbance of archeological sites by cattle would cause a long-term minor to moderate adverse impact. Continuing efforts of the memorial staff to identify and protect archeological resources would be beneficial to those resources.

Historic structures in the memorial would benefit from ongoing efforts to identify and preserve them, resulting overall in a long-term negligible to minor beneficial effect. Before any action was taken regarding the early 20th century Montezuma Ranch structures, a formal determination of their national register eligibility would be completed.

Ethnographic resources would benefit from inventories that would be developed, but the long-term minor beneficial effect would be partly offset by a lack of in-depth programs sponsored by the memorial. Therefore, the overall long-term beneficial effect on ethnographic resources would be negligible. American Indians would continue gathering items important to their culture on the memorial's lands. Visitors' understanding and appreciation of the Indian and Hispanic viewpoints about the Coronado Expedition would continue to be limited.

Cultural landscapes would benefit from the continued efforts of the national memorial staff to maintain such landscapes. Any construction in the memorial would be done so as to protect the views from Montezuma Pass. Identifying and preserving cultural landscapes would result in a long-term minor beneficial effect. Removing the visually

intrusive Montezuma Ranch structures would cause a long-term minor beneficial effect on the views from Montezuma Pass. Development outside the memorial could result in short-term and long-term minor to moderate adverse impacts on cultural landscapes.

Visitor Understanding and Recreational Resources. Visitor ***access to resources*** would be unchanged under alternative A, with most visitors spending one to two hours at the memorial's many attractions. Access for visitors with disabilities would continue to be inadequate. Thus, the ability of visitors to experience valuable resources would be limited, a negligible to minor adverse effect.

Continuing the existing interpretive materials and services would be helpful in ***interpretation and orientation***, giving visitors information and decreasing physical effects on resources. Continued crowding at the visitor center would damage the quality of the visitor experience, a long-term moderate adverse effect.

If ***visitor numbers*** and the demand for ***recreational resources*** continued to increase with no corresponding improvement in visitor services, there would be local minor to moderate long-term adverse impacts on the visitor experience. The memorial's facilities would deteriorate, and deferring maintenance to divert funds to recreational services could make the memorial less appealing as a recreation site. Removing the Montezuma Ranch structures and restoring and revegetating the area would enable visitors to enjoy an uninterrupted view of the San Pedro Valley from the Montezuma Peak scenic lookout, improving scenic values, a long-term minor to moderate beneficial effect. With increasing demands for recreation and opportunities to observe wildlife and vegetation, continuing grazing in the memorial would have a long-term minor to moderate adverse impact on visitors wanting to experience natural resources.

The Socioeconomic Environment. With few improvements in recreational facilities under alternative A, ***recreational use*** in the memorial would increase at about the same rate as visitation. Facilities and attractions would deteriorate through overuse, making the memorial less appealing, a negligible long-term adverse effect.

Cattle ***grazing*** in the memorial would continue to follow the actions set forth in the "Livestock Management Plan," but increased recreational use would lead to more complaints by recreational users about cattle. However, the economic effect on grazing would be negligible.

Alternative A would result in negligible effects on the ***local and regional economy*** from new jobs and visitor spending. Continuing grazing in the memorial would not cause any economic changes in grazing fees or cattle production. The memorial's ability to provide additional people trained in fighting wildland fires would be a minor long-term beneficial effect on the region.

Effects from Alternative B

Natural Resources. Ground disturbance to build the visitor center annex and add pullouts, new trails, and trailheads would affect less than 1 acre of ***soils*** and ***vegetation*** in a previously disturbed area, a long-term negligible to minor local adverse impact. The adverse effects on soils and vegetation from removing the Montezuma Ranch structures would be short term and negligible to minor because mitigative measures would minimize erosion and limit construction activities. Restoring and revegetating the site would offset the adverse effects and improve the ecosystem's health and integrity. Restoring and revegetating East Forest Lane and removing powerlines along the Montezuma Pass road would affect soils and vegetation on less than 50 acres, with negligible to minor long-term adverse effects. Ending grazing in the memorial would reduce nonnative species

and reestablish native vegetation, a long-term minor beneficial effect.

Threatened, endangered, or sensitive species would not be affected by the construction of the visitor center annex and hiking trails, parking lots, and pullouts. These actions would not alter the population of agave plants or affect the small mammals that are prey for loggerhead shrikes. Removing the Montezuma Ranch structures and restoring the area would improve the habitat for agave plants and small mammal species, resulting in negligible to minor beneficial effects on nectar-feeding bats and loggerhead shrikes. Ending grazing in the memorial would stop cattle from eating the memorial's agave plants and might increase the prey base and nesting habitat for loggerhead shrikes.

Long-term negligible to minor adverse impacts on ***water quality*** would result from building a visitor center annex and adding parking, pullouts, and trails. Parts of two accessible trails that cross drainages might need to be adjusted for slope requirements, which would reduce soil erosion in the riparian habitat. Reestablishing streambank vegetation after construction would reduce those effects. Native riparian vegetation would be restored, a long-term negligible to minor beneficial effect on riparian habitats. Removing the Montezuma Ranch structures and restoring and revegetating the area would cause negligible effects on water quality and wetlands. The long-term beneficial effects from restoring East Forest Lane and the powerline area would be negligible to minor. Ending grazing in the national memorial would stop livestock disturbance of soils and vegetation in riparian areas, reducing streambank erosion, a short-term minor beneficial effect.

Expanding the visitor center and adding trails would give ***wildlife*** more access to habitat, a negligible to minor beneficial effect from alternative B. However, slow or sedentary species such as amphibians and reptiles would be more at risk for adverse effects from construction. Some individuals might be lost, affecting their populations in the memorial. However, with mitigation to reduce the impacts, the overall long-term adverse effects on wildlife would be negligible to minor.

Removing the Montezuma Ranch structures, with mitigating measures to reduce impacts on rare or uncommon species, would cause long-term negligible adverse effects on wildlife. Restoring and revegetating the area would improve grassland habitat, a long-term negligible to minor benefit. Restoring and revegetating East Forest Lane and removing the powerline along the main road would increase habitat and food for many species of small mammals, nesting birds, and reptiles, a long-term negligible to minor beneficial effect. Closing East Forest Lane to vehicles would reduce the indirect effects of human presence. Ending grazing in the memorial would improve wildlife habitat and forage.

Cultural Resources. The impacts on ***archeological resources*** from alternative B would be partially or fully mitigated by sensitive siting and by designing facilities in relation to the resources. Any resources found by an archeological survey of the Montezuma Ranch would be preserved in place, a negligible long-term beneficial effect. Ending grazing in the memorial would help to conserve archeological resources; hence, the long-term beneficial effect on archeological resources would be negligible to minor.

The national memorial's ongoing efforts to identify and preserve ***historic structures*** would benefit these resources. Evaluating the Montezuma Ranch structures and the visitor center for eligibility for the National Register of Historic Places would produce a long-term negligible beneficial effect on historic structures.

Known ***ethnographic resources*** would not be affected by any action in alternative B. Long-term moderate to major beneficial effects would result from the national memorial's educational and interpretive programs, which

would promote the protection of tangible and intangible resources, and from efforts to emphasize the area's multicultural heritage.

Any effects on ***cultural landscapes*** from the minimal developments of alternative B would be partially or fully mitigated by sensitive siting and design, resulting in long-term minor to moderate beneficial effects on cultural landscapes.

The annex would enable the staff to present more in-depth interpretation of the memorial's natural and cultural resources, a long-term minor to moderate beneficial effect.

Visitor Understanding and Recreational Resources. Visitors' ***access to resources*** and cultural exhibits would be improved by developing four new trails, two of which would be made accessible for mobility-impaired visitors. Two new trails to be developed would be loop trails in the grasslands, one south of the main road near the Montezuma Ranch and one north of the entrance, the latter using part of the old Windmill Road. A trail partially accessible for visitors with disabilities also would be added in the grasslands north of the entrance. The present interpretive trail near the visitor center would be removed to allow the addition of the annex, but a new interpretive trail would be developed between the visitor center and the entrance to the memorial.

The memorial's grasslands would be more easily available for hiking and birding after the end of grazing in the memorial, a negligible to minor long-term beneficial effect. Congestion would be reduced and views would be more accessible after the addition of parking and pullouts. All these actions would cause long-term minor to moderate beneficial effects on the visitor experience.

Interpretation and orientation would be improved by upgraded interpretive materials and expanded outreach programs. Visitors would have an opportunity to understand the story of Coronado National Memorial, a moderate long-term beneficial effect on the visitor experience.

Enlarging the memorial's facilities would accommodate larger ***visitor numbers,*** improving ***recreation*** opportunities, a long-term minor to moderate beneficial effect on the visitor experience. Removing the Montezuma Ranch structures and restoring and revegetating the area would make available an uninterrupted view of the San Pedro Valley from the Montezuma Peak lookout, improving scenic values, a long-term minor to moderate beneficial effect. Ending grazing in the memorial would let visitors experience the grasslands' natural resources, a negligible to minor beneficial effect.

The Socioeconomic Environment. The visitor service enhancements, resource conservation measures, and outreach efforts of alternative B would enable the memorial to accommodate more ***recreational use*** without reducing the quality of the recreational experience, a moderate long-term beneficial effect on recreation.

Ending ***grazing*** in the memorial would benefit recreational use, but it would cause a negligible adverse effect on the county's economy. The loss of the payment of grazing fees to the National Park Service would be a negligible adverse effect on the memorial's operating budget.

The ***local and regional economy*** would receive negligible beneficial effects under Alternative B from new jobs, more spending caused by increased visitation, and NPS expenditures for construction labor and supplies. The availability of more trained firefighters would be a minor long-term beneficial effect on the region.

Effects from Alternative C

Natural Resources. Adding more parking would cause negligible to minor effects on

soils and ***vegetation*** in a previously disturbed area of less than 1 acre. More areas would be restored and revegetated in alternative C than in the other alternatives. Removing the Montezuma Ranch structures would cause negligible to minor short-term local adverse effects on soils and vegetation, but mitigative measures would be used. Restoring construction sites and the Montezuma Ranch area would reduce nonnative plants and bring back native species, improving ecosystem health and integrity, a local long-term local negligible to minor beneficial effect. Trail changes to provide better access would cause negligible to minor damage of soils and vegetation. Ending grazing in the memorial would reduce nonnative plants and increase native vegetation, a long-term minor beneficial effect.

Threatened, endangered, or sensitive species would not be affected by the addition of parking. Removing the Montezuma Ranch structures and restoring the area would establish habitat for agave plants and small mammal species, a negligible to minor beneficial effect for nectar-feeding bats and loggerhead shrikes. Ending grazing in the memorial would stop cattle consumption of agave plants, increasing the prey base and nesting habitat for loggerhead shrikes.

The effects on ***water quality*** from adding more parking would be negligible because the small parking area would not be in riparian habitat or adjacent to a stream channel. Restoring and revegetating more sites than in the other alternatives would reduce sedimentation into drainages, a long-term minor beneficial effect on water quality and the riparian habitat. Ending grazing in the memorial would produce a long-term minor beneficial effect on water quality.

The adverse effects on the memorial's ***wildlife*** from adding parking and upgrading trails would be negligible. Removing the Montezuma Ranch structures would cause negligible short-term adverse effects on wildlife, with mitigating measures reducing the impacts on rare or uncommon species. Restoring and revegetating areas would improve grassland habitat, benefiting wildlife species. Ending grazing in the memorial would improve habitat and forage, a long-term minor beneficial effect on wildlife.

Cultural Resources. Alternative C would not result in any effects on ***archeological resources*** because development would be limited, most of it in previously disturbed areas. Thus, the long-term beneficial effects on archeological resources would be negligible to minor.

The national memorial's various potential ***historic structures*** — specifically, the visitor center and the Montezuma Ranch structures — would be formally evaluated for their eligibility for listing on the National Register of Historic Places. Any ranch structures found ineligible for listing would be torn down; this would result in no effect. Any structures determined to be eligible would be stabilized and preserved, a long-term negligible beneficial effect on these resources. The visitor center would be retained.

The memorial's ***ethnographic resources*** would be protected from damage in alternative C because development would be limited. Restoring and revegetating roads, powerline areas, and areas with nonhistoric structures would make more areas suitable for ethnographic use, resulting in long-term negligible to minor beneficial effects on ethnographic resources.

Restoring ***cultural landscapes*** in the memorial to appear like those at the time of the Coronado Expedition would result in a negligible to minor long-term beneficial effect.

More in-depth interpretation would be feasible at the remodeled visitor center, but there could be more risk of vandalism or deterioration of the items. Overall, the long-term effects of alternative C on the collections would be negligible and beneficial.

Visitor Understanding and Recreational Resources. Visitors' ***access to resources*** would be enhanced by upgrading the trail at the visitor center and making it accessible to mobility-impaired visitors, but the beneficial effects would be negligible because the trail is small. Ending grazing in the memorial would enable some visitors to use grassland areas, but with no trails being developed in the allotment areas, the use would remain limited, a negligible beneficial effect on the visitor experience.

Interpretation and orientation would be improved by the memorial staff's efforts with other groups to reach beyond the boundary and tell the memorial's story. This would give visitors an opportunity to appreciate and understand Coronado National Memorial's story, a minor long-term beneficial effect on the visitor experience.

Visitor numbers would increase under alternative C, and opportunities for ***recreation*** would be improved by upgrading the interpretive trail, particularly for mobility-impaired visitors. Removing the Montezuma Ranch structures and restoring and revegetating the area would enable visitors to enjoy an uninterrupted view of the San Pedro Valley from the Montezuma Peak scenic lookout, improving scenic values, a long-term minor to moderate beneficial effect. Congestion would be reduced by adding parking, also a long-term minor to moderate beneficial effect.

The Socioeconomic Environment. In alternative C, ***recreational use*** would benefit from increased recreational services, improved facilities, better controls, and enhanced visitor services. This would result in minor long-term beneficial effects on recreation.

Ending ***grazing*** in the memorial would cause a negligible long-term beneficial effect on recreational use and a negligible adverse effect on the county economy from reduced cattle production. Ending the payment of grazing fees to the National Park Service would have a negligible adverse effect on the memorial's operating budget.

Alternative C would cause negligible beneficial effects on the ***local and regional economy*** from new jobs, more spending caused by greater visitation, and NPS spending for construction labor and supplies. Negligible adverse effects would result from decreased cattle production. The availability of more personnel trained in firefighting would be a minor long-term beneficial effect on wildland fire control in the county.

Effects from Alternative D

Natural Resources. Expanding the visitor center and adding picnic sites would cause negligible to minor adverse effects on previously disturbed ***soils*** and ***vegetation.*** The short-term and long-term adverse effects from paving, creating parking areas and trails, and building an educational center would be negligible to minor because the areas affected would be small and best management practices would reduce the damage. Only the vegetation adjacent to developments would be affected, and the harm would ultimately diminish as the area revegetated.

Removing the Montezuma Ranch structures and replacing them with new buildings or adapting them for use as an educational center would cause the trampling and uprooting of grassland vegetation, resulting in negligible adverse impacts on less than 20 acres. Adapting the existing structures for use as the educational center would cause fewer impacts than would building new structures because less construction would be needed. The local adverse effects would be negligible, as would the effects on vegetation throughout the memorial from either scenario. Adverse impacts on soils and vegetation from grazing in the Joe's Spring allotment would continue, but the minor long-term impacts would be offset by the beneficial effects of ending grazing in the Montezuma allotment.

The populations of agave plants used by ***threatened, endangered, or sensitive species*** would not be affected by the development-related activities of alternative D, although individual plants might be disturbed by trail construction in grasslands or by paving roads and parking areas. Removing the Montezuma Ranch structures might cause the loss of individual agave plants but would not adversely affect the memorial's total agave population, and it would not measurably affect small mammal prey species, especially those that are mobile or common. Adapting the ranch structures for use as an educational center would cause negligible to minor adverse impacts on sensitive species.

Expanding the visitor center and adding picnic sites in previously disturbed areas would cause negligible effects on ***water quality***. The development would not take place in riparian habitat or near drainages, and mitigating measures would minimize erosion and limit construction to the immediate area. Paving East Forest Lane and developing trails would cause short-term minor adverse effects on water quality and negligible to minor adverse effects on riparian habitat. In the long term, the impacts would be negligible because riparian vegetation along the streambank would recover. Riparian habitat would not be affected by removing the Montezuma Ranch structures and replacing them with new buildings or adapting them for the educational center. Continuing grazing in the Joe's Spring allotment would cause long-term minor adverse effects on water quality and riparian areas through continued streambank erosion and sedimentation, but ending grazing in the Montezuma allotment would offset these effects.

Negligible to minor adverse effects on ***wildlife*** would be caused by expanding the visitor center and adding picnic sites in previously disturbed areas. Removing the Montezuma Ranch structures would result in long-term negligible harm to wildlife, but mitigative measures would reduce the impacts on rare or uncommon species. Adding new trails also would adversely affect some wildlife species in the long term, but the effects would be negligible to minor because the areas affected would be small and previously disturbed. Widening and paving East Forest Lane would improve visitor access, resulting in roadkill and the continued fragmentation of habitat, a local long-term minor adverse effect on wildlife. Ending grazing in the Montezuma allotment would increase grassland forage and improve riparian habitat, a long-term minor benefit for wildlife.

Cultural Resources. The many ground-disturbing actions in alternative D would increase the possibility of affecting ***archeological resources***. However, about 70% of the actions would occur in formerly disturbed areas. The areas to be disturbed could contain unknown archeological resources, and if any were found, actions would be taken to protect them. Continuing grazing in the Joe's Spring allotment would allow more disturbance of archeological resources, mainly lithic scatters, but stopping grazing in the Montezuma allotment would end the risk of damage in that area. The continued damage of archeological sites by cattle would be a long-term negligible to minor adverse effect. The continuing identification and location of archeological resources would result in their being preserved in place, a negligible long-term beneficial effect. Overall, the long-term effects on archeological resources from alternative D would be negligible and adverse.

The ***historic structures*** on the Montezuma Ranch would be formally evaluated for their eligibility for listing on the National Register of Historic Places, as would the visitor center. Any ranch structures found ineligible for listing would be torn down; this would result in no effect. If any structures were found eligible for the national register, the staff would consult with the Arizona state historic preservation office to determine if they could be removed, adaptively used, or documented and then removed. If the visitor center was found eligible, the rehabilitation proposed in this alternative would result in a long-term

moderate beneficial effect. The overall long-term effect on historic structures from alternative D would be negligible and beneficial.

Ethnographic resources could be affected by improved access from new and upgraded trails and roads, which could bring visitors to areas previously visited very little. Thus, alternative D could have a long-term negligible adverse impact on ethnographic resources.

Alternative D would be more likely to affect ***cultural landscapes*** than the other alternatives because of the variety of actions involved (building roads, facilities, and trails). Efforts would be made to perpetuate the appearance of the area as it looked to the Coronado Expedition. Although care would be taken in designs and vegetative screening, vehicles on roads and in parking lots still could be visually intrusive. Overall, the long-term effect of alternative D on cultural landscapes would be adverse and negligible to minor.

Visitor Understanding and Recreational Resources. Alternative D would improve visitors' ***access to resources*** because paving East Forest Lane so that vehicles could reach the new commemorative feature would enable people to experience the natural resources of the grasslands, a long-term moderate to major beneficial effect. Visitors also could experience the grassland habitat of the Montezuma grazing allotment, a negligible to minor beneficial effect because only a small number of visitors use the memorial's trails. Access to natural resources and cultural exhibits for people with disabilities would increase, a negligible to minor beneficial effect.

Interpretation and orientation would be enhanced by improved interpretive materials and expanded outreach programs, which would emphasize the memorial's mission, purpose, and significance. Opportunities for visitors to learn about and understand the memorial's resources would be a moderate to major beneficial effect.

The congestion of ***visitor numbers*** would be reduced in alternative D by the addition of an educational center and a group picnic area. There would be short-term minor to moderate adverse effects on ***recreation*** from construction noise and the temporary closure of some areas, but the expanded facilities would reduce crowding and enable the memorial to accommodate more visitors, a moderate to major beneficial effect. With increasing demands for recreation and opportunities to observe wildlife and vegetation, continuing grazing in one allotment would have a long-term negligible to minor adverse impact on visitors wanting to experience the memorial's natural resources.

The Socioeconomic Environment. In alternative D, ***recreational use*** would benefit from enhanced visitor services, resource conservation measures, and outreach efforts. The memorial could accommodate more visitation without harming the quality of the recreation experience, a moderate long-term beneficial effect.

Ending ***grazing*** in the Montezuma allotment would prevent some visitor-livestock conflicts. The ranchers who would lose the grazing capacity would not be able to replace it, an adverse effect on individual ranchers, but the countywide adverse effect would be negligible. Therefore, eliminating grazing from one allotment would result in a minor long-term beneficial effect on recreational use and a negligible adverse effect on the county economy from reduced cattle production. The memorial would be able to offer more recreational opportunities by placing recreational amenities south of the main road, a minor beneficial effect on recreation.

Alternative D would cause negligible beneficial effects on the ***local and regional economy*** from new jobs, more spending caused by greater visitation, and NPS spending for construction labor and supplies.

Negligible adverse effects would result from decreased cattle production. The availability of more personnel trained in firefighting would be a minor long-term beneficial effect on wildland fire control in the county.

Effects from Alternative E

Natural Resources. Local short-term and long-term negligible to minor adverse effects on ***soils*** and ***vegetation*** would result from building a new visitor center and a hardened parking area in the grassland now occupied by the Joe's Spring allotment. This would result in soil erosion and compaction on previously grazed land. Paving roads, adding parking areas, and developing trails would cause short-term and long-term negligible to minor damage of soils and vegetation. Those effects would diminish over time as vegetation along the road recovered. Removing the structures from the Montezuma Ranch would cause short-term negligible to minor adverse impacts on soils and vegetation, which would be offset by long-term beneficial effects from restoring and revegetating the site, reducing compaction and increasing permeability, a local long-term negligible to minor beneficial effect. Continuing grazing in the Montezuma allotment would cause minor long-term adverse impacts on soils and vegetation, but they would be offset by eliminating grazing from the Joe's Spring allotment.

Alternative E would affect ***threatened, endangered, or sensitive species*** because the ground-disturbing activities associated with buildings, trails, and road access into the grasslands would disturb vegetation and wildlife. Removing the Montezuma Ranch structures and restoring and revegetating the area would result in more habitat for agave plants and more ground cover and habitat for small rodent species. Revegetation also would benefit nectar-feeding bats and loggerhead shrikes by increasing the available food. Continuing grazing in the Montezuma allotment would continue negligible to minor adverse effects on the vegetation and wildlife on which sensitive species rely for food and habitat.

Cultural Resources. The potential to affect ***archeological resources*** would increase because many of the ground-disturbing actions in alternative E would take place in previously undisturbed areas. Actions would be taken to protect any unknown archeological resources found in the areas to be disturbed. Continuing grazing in the Montezuma allotment would allow further disturbance of archeological resources, mainly lithic scatters, but eliminating grazing from the Joe's Spring allotment would end the possibility of grazing damage in that area. The continued disturbance of archeological sites by cattle would result in a long-term minor to moderate adverse impact on archeological resources. The continuing identification and location of archeological resources would result in their being preserved in place, a negligible long-term beneficial effect. Overall, the actions of this alternative would result in a long-term negligible to minor adverse impact on archeological resources.

The visitor center and the ***historic structures*** on the Montezuma Ranch would be formally evaluated for their eligibility for listing on the National Register of Historic Places. Any ranch structures found ineligible for listing would be torn down; this would have no effect. If any structures were found eligible for the national register, the staff would consult with the Arizona state historic preservation office to determine if they could be demolished. If the visitor center was found eligible, its rehabilitation would result in a long-term moderate beneficial effect. The overall long-term effect on historic structures from alternative E would be negligible and beneficial.

The possibility of adversely affecting ***ethnographic resources*** would be greater in alternative E than in some of the other alternatives because visitors would have more access to the grasslands in the national memorial. The long-term adverse effects of this alternative

on ethnographic resources would be negligible.

Cultural landscapes could be affected by the construction of roads and trails and the removal of nonhistoric structures; however, none of the roads, trails, or structures have been identified as being part of cultural landscapes. Visual intrusions on the views replicating the appearance of the country at the time of the Coronado Expedition could occur from vehicles on roads and in parking lots, although the designs and vegetative screening would be planned with care. The long-term adverse effects on cultural landscapes from alternative E would be minor.

Visitor Understanding and Recreational Resources. Visitors' ***access to resources*** would be enhanced in alternative E by the ability to visit grassland habitats now used for grazing in the Joe's Spring allotment, a negligible to minor beneficial effect. Minor beneficial effects would result from increased access for visitors with disabilities to trails leading to natural resources and cultural exhibits. A paved road to the visitor center would offer access to an area not previously accessible by vehicles, a long-term moderate to major beneficial effect. Removing the Montezuma Ranch structures and restoring and revegetating the area would enable visitors to enjoy an uninterrupted view of the San Pedro Valley from the Montezuma Peak scenic lookout, improving scenic values, a long-term minor to moderate beneficial effect.

Minor beneficial effects for ***interpretation and orientation*** would result from the memorial staff's working with various groups to tell the memorial's international stories. A new visitor center would enable people to enjoy a view of the landscape and the valley. This would add a major attraction that could help visitors understand and appreciate the memorial's history.

Larger ***visitor numbers*** could be accommodated in the new, roomier visitor/educational center, which would help to disperse visitors and relieve crowding, a long-term moderate to major beneficial effect. The long-term adverse effects on ***recreation*** from new developments that would affect the viewshed would be negligible. With increasing demands for recreation and opportunities to observe wildlife and vegetation, continuing grazing in one allotment would have a long-term negligible to minor adverse impact on visitors wanting to experience natural resources.

The Socioeconomic Environment. In alternative E, ***recreational use*** would benefit from improved facilities and visitor services, resource conservation actions, and outreach efforts. The memorial could accommodate more visitation without harming the quality of recreation that visitors would experience. This would be a moderate long-term beneficial effect.

Ending ***grazing*** in the Joe's Spring allotment would avert some human-livestock conflicts. The ranchers who would lose the grazing capacity would not be able to replace it, an adverse effect on individual ranchers, but the countywide effect would be negligible. Therefore, eliminating grazing from one allotment would result in a minor long-term beneficial effect on recreational use and a negligible adverse effect on the county's economy from reduced cattle production. The national memorial could offer more recreational opportunities by placing facilities north of the main road, a minor beneficial effect on recreational use.

Negligible beneficial effects on the ***local and regional economy*** would result from alternative E because of new jobs, added spending by more visitors, and NPS payments for construction labor and supplies. Negligible adverse effects would be caused by decreased cattle production. The availability of more trained firefighters would be a minor long-term beneficial effect on wildland fire control in the county.

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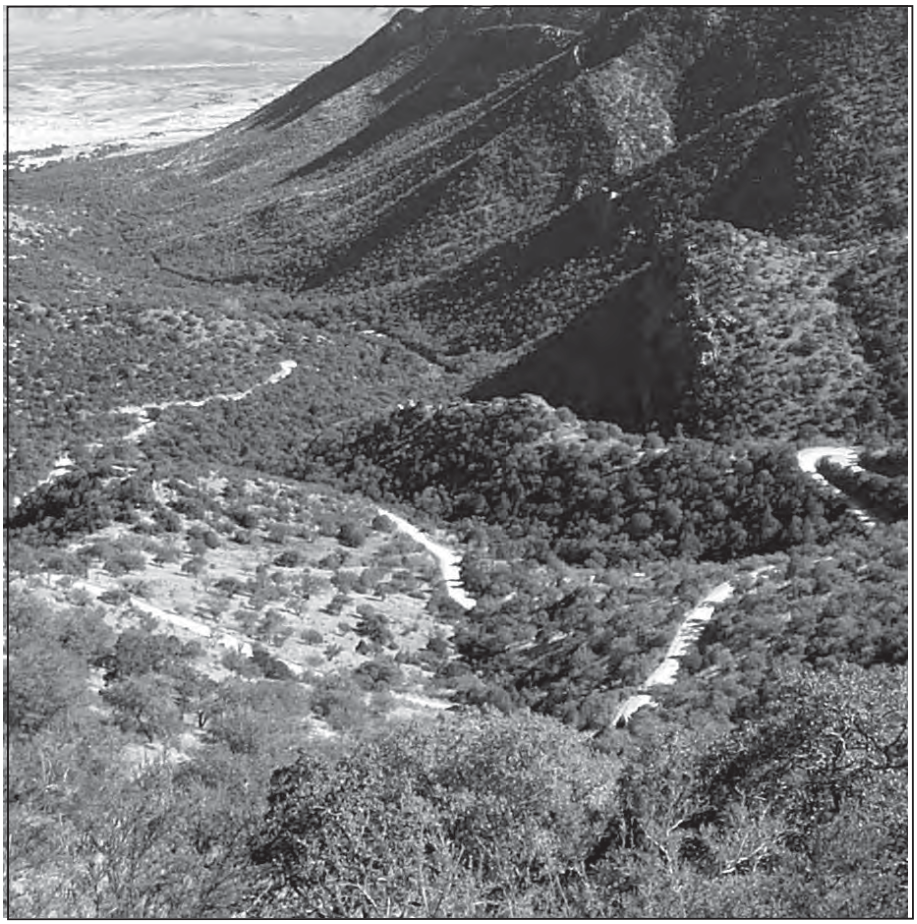

INTRODUCTION

THE PLAN

This *Final General Management Plan / Environmental Impact Statement* contains analyses of four alternative future approaches for the management and use of Coronado National Memorial. A fifth "no-action" alternative represents the continuation of the current management direction into the future. This provides a basis for comparing the four "action" alternatives. One alternative has been identified as the alternative preferred by the National Park Service (NPS). The potential environmental consequences that could result from implementing each alternative have been identified and assessed.

General management plans are intended to be conceptual documents that establish and articulate a management philosophy and framework for decision making and problem solving in the area to be managed. These plans usually provide guidance over a period of 15 to 20 years.

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

BRIEF DESCRIPTION OF THE AREA AND THE MEMORIAL

Coronado National Memorial (4,750 acres) is in Cochise County in southeast Arizona, 21 miles south of Sierra Vista and 26 miles west of Bisbee on the United States–Mexico border. The memorial is 50 miles south of Benson, on Interstate 10, off Arizona Highway 92. The road through the memorial is paved to about a mile beyond the visitor center and then becomes a mountainous dirt-and-gravel road that leads to Montezuma Pass. This dirt road continues west through the San Rafael Valley and over the Patagonia Mountains to Nogales — a slow, scenic drive.

The memorial's significance can best be realized by placing it in a historical perspective. In the second quarter of the 16th century, the territory north of central Mexico was a massive, mysterious, unknown land to the Spanish. Spain's explorers touched its fringes in Florida and along the Gulf of Mexico, but very little penetration of the interior had resulted. From 1539 to 1543, Spain undertook three major expeditions to explore the unknown lands to the north. Hernando de Soto explored Florida and what became the southeastern United States; Juan Rodríguez Cabrillo explored the west coast; and Francisco Vásquez de Coronado explored northwestern Mexico and what became the southwestern United States from California to Kansas. This was just 50 years after the Columbus voyages and 80 years before the Pilgrims landed at Plymouth Rock.

The 2.5-year Coronado Expedition (1540–1542) probably entered the United States via the San Pedro River Valley immediately east of the national memorial. No physical evidence has been found to substantiate the actual route of Coronado at the existing international boundary. However, the important aspect of the expedition was not its actual crossing point, but rather the international implications and the Hispanic cultural development initiated by these events. Today the Spanish language, Spanish and Mexican food, Spanish–Mexican influenced architecture, and other Hispanic customs are evident in our lives, not only in the Southwest, but throughout the nation.

The area was authorized as an international memorial in 1941 and established as a national memorial in 1952 (see appendix A). The 4,750-acre memorial contains desert grasses and shrubs in lower elevations with oak woodlands and piñon-juniper forest in upper elevations. The terrain varies from open grasslands to steep ridges. The national memorial is encircled on three sides by ridges that rise more than 1,000 feet above the valley floor. The memorial preserves a wide array of plant and animal life native to the southwestern United States. More than 160 species of birds have been sighted in the memorial. In addition, a wide variety of mammals, birds, amphibians, and reptile species either inhabit the area or migrate through.

The memorial's interpretive offices are at the visitor center. Administrative offices, maintenance facilities, and several auxiliary structures are in the same area, as are two employee residences. A third (former) house has additional offices. Inside the visitor center, space for preparing and presenting programs is limited, and there is not enough room to accommodate school groups or tour groups. The interpretive media are dated but are being revised as funding permits.

Visitors who come into the visitor center can look at exhibits depicting the Coronado Expedition and the wildlife native to the area, shop for books, watch a film presentation, and receive orientation to the memorial. There is a short interpretive trail near the visitor center. A nearby picnic area is open during daylight.

Some visitors go to Coronado Cave, and only a small percentage of the people who visit the memorial hike the trails. Access to natural resources and cultural exhibits via the trails is limited because those trails were not designed for people with disabilities, but mobility-impaired people can get to the Montezuma Pass overlook, the visitor center, and the picnic area.

Three miles west of the visitor center, the scenic overlook at Montezuma Pass offers views of the San Raphael Valley to the west, the San Pedro River Valley to the east, and Mexico to the south. Wayside signs placed around the Montezuma Pass parking lot can help visitors understand the area's physiographic and historical significance. From a short trail to Coronado Peak, one can see unobstructed vistas of the area through which the Coronado Expedition passed. Along the Coronado Peak trail are signs with quotations from the journals of the Coronado Entrada. At the peak a ramada shades visitors from the sun while they look at the San Pedro and San Rafael Valleys south into Mexico.

Windmill Road is in the grasslands south of the main road and just north of the memorial entrance. On its course to the international border, this two-lane dirt road crosses an ephemeral streambed. The picnic area, the pullout near the State of Texas mine, the main road, and the trail to the picnic area are in or adjacent to stream channels. The East Forest Lane road and the Windmill Road (dirt roads) cross drainages.

The Joe's Canyon trail branches off the Coronado Peak trail and continues 3 miles down to the visitor center and picnic area. Both of these trails are part of the national trails system. The Yaqui Ridge trail descends steeply from the Joe's Canyon trail down to International Boundary marker 102. Across from the parking area at Montezuma Pass begins the Crest Trail, which leads to Miller Peak. This also serves as the beginning of the developing Arizona Trail. When completed, that trail will end at the Utah border. Coronado Cave is reached by a trail 0.75 mile long that begins at the visitor center.

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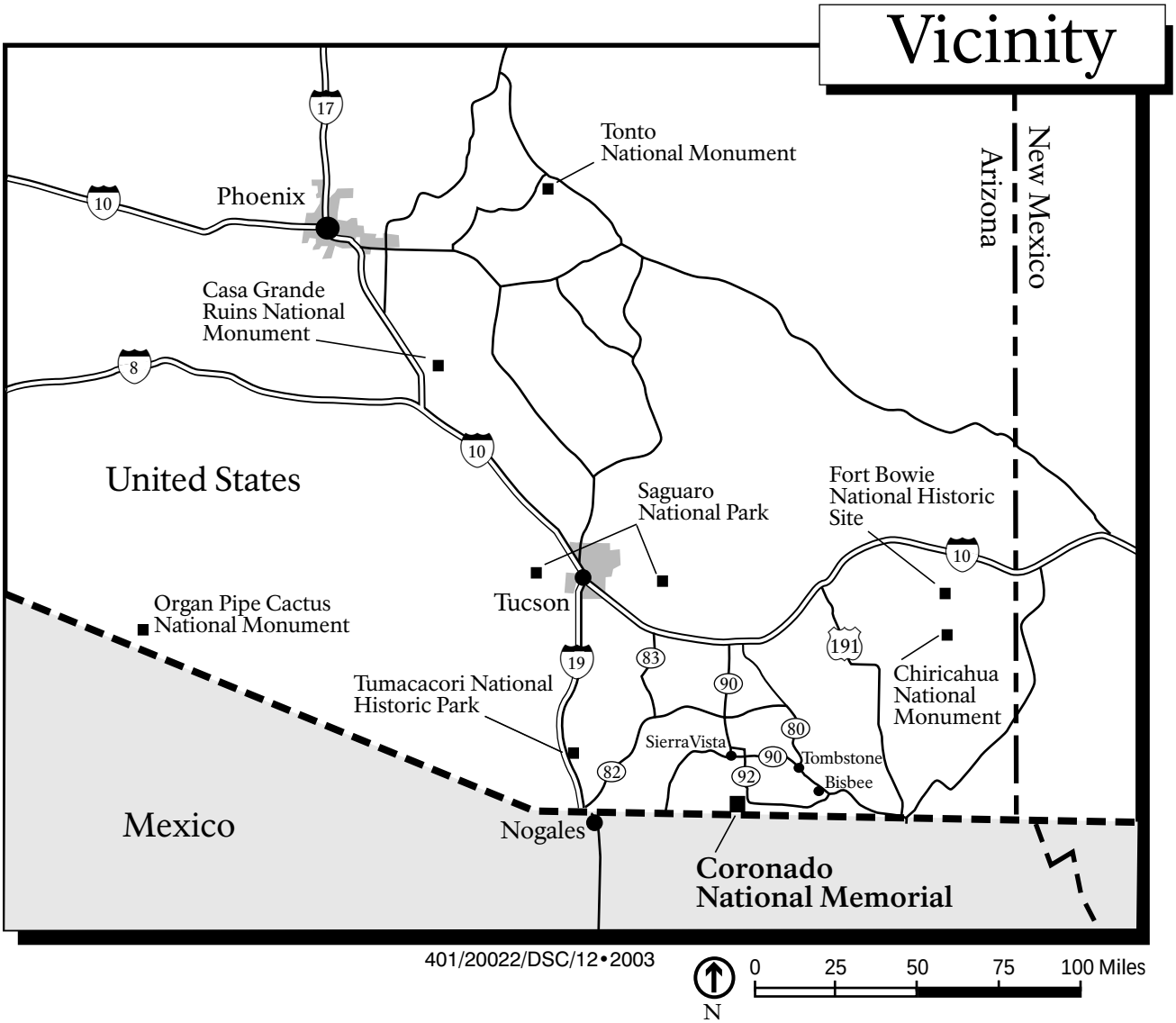
Coronado National Memorial • Arizona

National Park Service
U.S. Department of the Interior



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PURPOSE OF AND NEED FOR THE ACTION

OVERVIEW

The purpose of this *General Management Plan* is to clearly define a direction and philosophy for resource preservation and visitor use at Coronado National Memorial. The existing plan needs updating to reflect the increasing use of the memorial. While the general management plan is being finalized, the memorial managers will continue to follow the laws, policies, and guidelines that the National Park Service is required to comply with as part of its standard operating procedures. These laws and guidelines include the National Environmental Policy Act of 1969 (NEPA), section 106 of the National Historic Preservation Act of 1966 (as amended), and NPS *Management Policies 2001*.

PURPOSE, SIGNIFICANCE, MISSION, AND THEMES

Agencywide laws, as well as laws, regulations, and policies specific to the unit, guide each unit in the national park system. Understanding this guidance and how it affects the memorial's mission is fundamental to planning for the memorial's future. This section highlights the mission (expressed as memorial purpose, significance, and mission statements), legal policies, and mandates that guide the management of Coronado National Memorial. These mission and mandate statements define the "sideboards" within which all management actions must fall. All alternatives to be considered in the general management planning effort must be consistent and contribute to fulfilling these missions and mandates.

The memorial's purpose and significance and the primary interpretive themes were used to develop all alternatives for this plan. The National Park Service defines interpretation as providing information to visitors about the site so that they can understand why Congress set aside the park unit (in this case, Coronado National Memorial). In addition, interpretation provides a connection between visitors' interests and the meaning of the national memorial. The memorial's legislation, public comments, NPS policy, legal requirements, and resource values were analyzed in developing the following critical elements.

Purpose Statement

The following statement describes the primary reason that the memorial was created. It influences management priorities and is central to decisions about how the memorial should be developed and managed.

The purpose of Coronado National Memorial is to

> permanently commemorate the explorations of Francisco Vásquez de Coronado and preserve and protect the cultural and natural resources within the memorial for public benefit and enjoyment.

Significance Statement

Coronado National Memorial is significant for the following reasons:

- Coronado National Memorial is the only unit in the national park system that commemorates the Francisco Vásquez de Coronado Expedition of 1540–1542. When reporting to Congress in 1940 on the establishment of the memorial, the Committee on Public Lands and Surveys said,

  > Coronado's expedition was one of the outstanding achievements of a period marked by notable explorations. His expedition made known the vast extent

> and the nature of the country that lay north of central Mexico, and from the time of Coronado, Spaniards never lost interest in the country. In no small measure their subsequent occupation of it was due to the curiosity so created.

- The creation of the memorial was not to protect any tangible artifacts related to the expedition. It was created to give visitors an opportunity to reflect upon the impact the Coronado Entrada had in shaping the history, culture, and environment of the southwestern United States and its lasting ties to Mexico and Spain.

- The location was chosen for the panoramic views of the United States–Mexico border and the San Pedro River Valley, the route believed to have been taken by Coronado. It was hoped that this proximity to the border would strengthen binational amity and the bonds, both geographical and cultural, that continue to link the two countries.

- The memorial, near the center of the Sky Island bioregion (the juncture of four major biogeographic provinces: Madrean, Sonoran, Chihuahuan, and Southern Rockies/Mogollon), preserves a rich biological and geological diversity. Visitors are able to enjoy recreational opportunities that foster a better understanding and appreciation of the area's natural and human history.

Mission Statement

The mission statement is based on the national memorial's purpose and significance. It includes future conditions or visions, stated as outcomes, and articulates the ideals that the National Park Service is striving to obtain for Coronado National Memorial. This qualitative statement is expressed in terms of resource conditions and appropriate visitor experiences. The memorial's mission goals are consistent with the mission goals found in the National Park Service's *Strategic Plan*. Thus, they support the overall mission of the agency.

The Coronado National Memorial mission is

> to commemorate and interpret the significance of Francisco Vásquez de Coronado's expedition and the resulting cultural influences of 16th century Spanish colonial exploration in the Americas. The memorial preserves and interprets the natural and human history of the area for the benefit and enjoyment of current present and future generations.

Primary Interpretive Themes

Interpretive themes are ideas, concepts, or stories that are central to the memorial's purpose, identity, and visitor experience. Primary themes provide the framework for Coronado National Memorial's interpretation and educational programs, influence the desired visitor experience, and provide direction for planners and designers who develop the memorial's exhibits, publications, and audio-visual programs. The draft primary themes are detailed below. Subthemes may be added during subsequent interpretive planning.

As a context for the memorial's interpretive themes, it should be noted that the Spanish discovery and eventual settlement of what is now the southwestern United States occurred much earlier than European settlement of what is now the eastern United States. The earlier conquest of Mexico and Peru fueled a race to the unknown northern lands by Spanish explorers Coronado, DeSoto, and Cabrillo. The Spanish conquest, although controversial, is a fascinating story of how a small force, with the aid of technology, was able to lay the groundwork for Spain's control of a vast empire. The memorial's interpretive themes are as follows:

- The Coronado Expedition (1540–1542), the first major exploration of the Southwest by Europeans, was an incredible feat that made known the vast extent of the land and culture north of central Mexico.

- The expedition, intended to win converts to Catholicism, find gold, and claim land, had and continues to have a major impact in shaping the history, social and political culture, and environment of the southwestern United States and Mexico.
- Coronado National Memorial preserves and interprets a rich biological and geological diversity typical of the Sky Island bioregion.
- The unique natural features and panoramic views of the area remain similar to the actual time of the expedition and provide an excellent opportunity for contemplating the thoughts, motives, and hardships of the members of the Coronado Expedition and its impacts on native populations, their cultures, and the environment.

CONSTRAINTS, ISSUES, AND CONCERNS

During the planning process, the planning team identified a variety of issues that the National Park Service may face in the future. The plan will provide a framework or strategy for addressing those issues within the context of the memorial's purpose, significance, and mission. The following issues were identified and refined through discussions with national memorial staff, interested agencies and organizations, and the general public.

International Significance

The memorial's southern boundary is on the border between the United States and Mexico. How can the memorial best commemorate the relationship between the United States and Mexico?

Protection of Resources and the Visitor Experience

The memorial's location on the U.S.–Mexico border has resulted in an illegal trafficking in drugs and people, which adversely affects both resources and the visitor experience. How can the experience of visitors to the memorial best be safely maintained and enhanced?

Views

The memorial contains superlative views of the San Pedro River Valley in the United States and Mexico, and these views represent an important part of the visitor experience. To carry out the memorial's purpose, the surrounding landscape is important. Various modern encroachments are gradually intruding on this landscape. How best can the National Park Service preserve the landscape at the memorial's boundaries and beyond?

Interpretation

The memorial's mission is to commemorate and interpret the first major exploration by Europeans into the American Southwest and the events associated with that milestone. What is the interpretive role of the National Park Service? What stories should be told and how can they best be conveyed?

Orientation

It is difficult for visitors to gain a full understanding of the memorial and its geographical context. Highways to the memorial are poorly marked and lack clear direction. Some visitors do not understand the distinction between the memorial and the surrounding national forest. How can the lack of awareness of the memorial within the regional setting be addressed?

Development

The visitor center, headquarters building, maintenance facilities, and staff housing are inadequate. NPS managers must determine what facilities are necessary for future visitor experiences and resource protection needs. Efficiency and sustainability are prime

considerations, as is providing a setting that promotes visitor understanding. *(Sustainability* refers to results attained by managing an area in ways that do not compromise the environment or its capacity to provide for present and future generations. Sustainable practices minimize the environmental effects of developments and other activities by conserving resources, minimizing waste, recycling, and using energy-efficient, ecologically responsible materials and techniques.)

Livestock Management

Two areas in the memorial are leased out as grazing allotments. A concern has been raised about conflicts between the NPS mission and the potential detrimental effect of grazing on recreation and resources. NPS managers must determine the role of grazing while providing for visitor understanding and resource protection.

PARTNERSHIPS

Public involvement is required to maximize the services offered to visitors and to counteract the effect of overextended NPS funding and staff. A strategy must be developed to encourage public and private groups to assist in the mission of Coronado National Memorial.

RELATIONSHIP TO OTHER PLANNING EFFORTS

Possible conflicts between the alternatives and county, state, or tribal or federal land use plans and policies must be considered. Coronado National Memorial is adjacent to the U.S. border with Mexico. Coronado National Forest is adjacent to the memorial on its northern and western boundaries. There is a single state parcel on the southeastern boundary of the memorial. The remaining surrounding land is primarily privately owned residential and agricultural lands with a few commercial parcels.

About 10 miles east of the memorial, the San Pedro Riparian National Conservation Area, administered by the Bureau of Land Management, extends along the river corridor from the Mexican border to several miles south of Saint David. This area was set aside to protect and enhance the riparian ecosystem and related resources. Birds nest in the San Pedro and use it as a migratory pathway. A variety of grassland and riparian species can be seen in this area. North of the memorial is the community of Fort Huachuca. Coronado National Forest is adjacent to the memorial on the north. Together, Coronado National Forest and Fort Huachuca cover 73,000 acres. There are no tribal lands nearby.

The U.S. Forest Service is constructing a trail system along the eastern side of the Huachuca Mountains that may eventually connect to the memorial boundary near its northeast corner.

The National Park Service is participating as a cooperating agency in an environmental assessment about a proposal to place a remote video surveillance camera in Coronado National Memorial. Other agencies involved are the United States Border Patrol, Immigration and Naturalization Service, U.S. Department of Justice. In addition, the National Park Service will have an opportunity to comment on an environmental assessment about a proposal to install vehicle barriers along part of the memorial's boundary (which is also the international border). The National Park Service will request funding from Congress for vehicle barriers.

The U.S. Border Patrol has begun the scoping process for a proposal for other improvements, including an improved border road and a 300-foot security zone along the U.S.–Mexico border. All the planning and compliance efforts for the Border Patrol projects involve lands inside and outside Coronado National Memorial.

Changes brought about by any of the alternatives would not conflict with any of the approved plans of other jurisdictions. (For more details, see "Cumulative Effects," p. 115.)

SPECIAL PARK MANDATES AND ADMINISTRATIVE COMMITMENTS

Coronado National Memorial, created from U.S. Forest Service lands, was authorized in 1941 and established in 1952. The 1941 legislation provided for the continuation of grazing within the memorial boundaries "provided it does not interfere with recreational development."

The National Park Service in 2000 published the *Livestock Management Plan, Including Livestock Management Guidelines, Environmental Assessment* (NPS 2000b) and allotment treatment plans. Among other provisions, it calls for the National Park Service to work toward permanently retiring the remaining grazing allotments as opportunities arise to do so through mutual agreement with the permittees. Until this can be accomplished, the *Livestock Management Plan* will serve to moderate the effects of grazing. Some alternatives of this *General Management Plan* could result in retiring one or both of the grazing allotments.

SERVICEWIDE LAWS AND POLICIES

As with all units of the national park system, the management of Coronado National Memorial is guided by the 1916 Organic Act that created the National Park Service, the General Authorities Act of 1970, the act of March 27, 1978 (relating to the management of the national park system), and other applicable federal laws and regulations such as the Endangered Species Act and the National Historic Preservation Act. Actions also are guided by NPS *Management Policies 2001*.

Many resource conditions and some aspects of the visitor experience are prescribed by these legal mandates and NPS policies. The management plan is not needed to decide, for instance, whether or not it is appropriate to protect endangered species, control exotic species, improve water quality, protect archeological sites, provide access for visitors with disabilities, or conserve artifacts. Although attaining some of these conditions has been deferred in the memorial because of funding or staffing limitations, the National Park Service will continue to strive to implement these requirements with or without a new general management plan.

The conditions prescribed by the laws, regulations, and policies most pertinent to the planning and management of the memorial are summarized in the following charts.

Natural Resource Management Requirements

Air Quality	
Desired Condition	**Source**
Air quality in the memorial, a class II air quality area, meets national ambient air quality standards (NAAQS) for specified pollutants.	Clean Air Act, NPS *Management Policies 2001*
Memorial activities do not contribute to deterioration in air quality. Healthful indoor air quality is ensured in NPS facilities.	Clean Air Act, NPS *Management Policies 2001*
Compliance Actions	
Although the National Park Service has very little direct control over air quality within the airshed encompassing the region, memorial managers cooperate with the Arizona Department of Environmental Quality and the Environmental Protection Agency to monitor air quality and ensure that air quality is not degraded. In addition, the National Park Service will take the following actions to meet legal and policy requirements related to air quality: ▪ Participate in regional air pollution control plans and regulations and review of permit applications for major new air pollution sources. ▪ Conduct memorial operations in compliance with federal, state, and local air quality regulations.	

Water Quality	
Desired Condition	**Source**
Surface water and groundwater are restored or enhanced.	Clean Water Act; Executive Order (EO) 11514; NPS *Management Policies 2001*
NPS and NPS-permitted programs and facilities are maintained and operated to avoid pollution of surface water and groundwater.	Clean Water Act; EO 12088; NPS *Management Policies 2001*
Compliance Actions	
The National Park Service will take the following actions: ▪ Apply best management practices to all pollution-generating activities and facilities in the memorial, such as NPS maintenance and storage facilities and parking areas; minimize use of pesticides, fertilizers, and other chemicals, and manage them in keeping with NPS policy and federal regulations.	

Natural Resource Management Requirements (continued)

Species of Special Concern	
Desired Condition	**Source**
Populations of native plant and animal species function in as natural condition as possible except where special management considerations are warranted.	Endangered Species Act; NPS *Management Policies 2001*
Native species populations that have been severely reduced in or extirpated from the memorial are restored where feasible and sustainable.	NPS *Management Policies 2001*
Management of populations of exotic plant and animal species, up to and including eradication, will be undertaken wherever such species threaten memorial resources or public health and when control is prudent and feasible.	NPS *Management Policies 2001*; EO 13112, *Invasive Species.*
Compliance Actions	
Several species of invasive exotic plants have become established in disturbed areas in the memorial and represent a threat to native species. Given time, these aggressive exotic plants can greatly expand their populations, alter forest and wildlife habitats, and change memorial scenery by smothering and displacing native species. These effects, already clearly occurring in some areas of Coronado National Memorial, will worsen substantially if left untreated. A sustained effort is needed to control these internal threats to the native species and their natural habitats. The National Park Service will take the following actions to comply with legal and policy requirements related to native species and to manage the national memorial "in as natural condition as possible." ▪ Complete an inventory of plants and animals in the memorial and regularly monitor the distribution and condition (health or disease) of selected species that are (a) indicators of ecosystem condition and diversity, (b) rare or protected species, (c) invasive exotics, or (d) native species capable of creating resource problems (such as habitat decline due to overpopulation). ▪ Support research that will contribute to knowledge for the management of native species. ▪ Take mitigating actions to restore native species and their habitats where warranted. ▪ Control or eliminate exotic plants where there is a reasonable expectation of success and sustainability. ▪ Obtain a systematic survey of rare plants and animals to improve management. Particularly, inventory and monitor threatened or endangered species, improve habitat for and the protection of endangered bats and Mexican spotted owls, and assess the barking frog population.	

Wildland Fire	
Desired Condition	**Source**
Fire management programs in the memorial will be designed to meet resource management objectives prescribed for various areas of the memorial and to ensure that firefighter and public safety are not compromised. Until a fire management plan is approved, all wildland fires must be aggressively suppressed, taking into account resources to be protected and firefighter and public safety.	NPS *Management Policies 2001*; DO 41, *Wilderness Preservation and Management*
Compliance Actions	
All fires burning in natural or landscaped vegetation in Coronado National Memorial will be classified as either wildland fires or prescribed fires. All wildland fires will be effectively managed, considering resource values to be protected and the safety of firefighters and the public, using the full range of strategic and tactical operations as described in an approved fire management plan. Prescribed fires are fires ignited by managers to achieve resource objectives. For prescribed fires, actions will include monitoring programs that record fire behavior, smoke behavior, fire decisions and fire effects to provide information on whether specified objectives are met. The memorial intends to begin drafting a fire management plan in FY 04, which should be completed during FY 05.	

Natural Resource Management Requirements (continued)

Night Sky [referred to as Lightscape Management in *NPS Management Policies 2001*]	
Desired Condition	**Source**
The National Park Service will cooperate with neighbors and local government agencies in seeking to minimize the intrusion of artificial light into the night scene in the national memorial. In natural areas, artificial outdoor lighting will be limited to basic safety requirements and will be shielded when possible.	NPS *Management Policies 2001*
Compliance Actions	
The National Park Service will take the following actions to comply with legal and policy requirements related to the night sky. ▪ Work with local communities and other agencies to encourage the protection of the night sky. ▪ Evaluate impacts on the night sky caused by facilities in the memorial. If light sources in the memorial are found to affect night skies, memorial staff will study alternatives such as shielding lights, changing lamp types, or eliminating unnecessary sources.	

Natural Sounds [referred to as Soundscape Management in *NPS Management Policies 2001*]	
Desired Condition	**Source**
An important part of the NPS mission is to preserve or restore the natural soundscapes associated with units of the national park system, including Coronado National Memorial. The sounds of nature are among the intrinsic elements that combine to form the environment of our national memorial. The National Park Service will preserve the natural ambient soundscapes, restore degraded soundscapes to the natural ambient condition wherever possible, and protect natural soundscapes from degradation due to human-caused noise. Disruptions from recreational uses will be managed to provide a high-quality visitor experience, striving to preserve or restore the natural quiet and sounds.	NPS *Management Policies 2001;* DO 47, *Sound Preservation and Noise Management*
The Federal Aviation Administration and the National Park Service were directed to "develop appropriate educational and other materials for the public at large and all aviation interests that describe the importance of natural quiet to memorial visitors and the need for cooperation from the aviation community."	Executive memorandum signed by President Clinton on April 22, 1996
Compliance Actions	
The National Park Service will take the following actions to comply with this policy: ▪ Take actions to prevent or minimize unnatural sounds that adversely affect the memorial's resources or values or visitors' enjoyment of them. ▪ The National Park Service will work with the Federal Aviation Administration (FAA) and the Department of Defense (DOD), tour operators, commercial businesses, and general aviation interests to encourage aircraft to fly outside the national memorial, especially for flights where the presence of the memorial is incidental to the purpose of the flight (such as when the flight is simply a transit between two points). Actions that may be considered to encourage pilots to fly outside the memorial include identifying the memorial on route maps as a noise-sensitive area, educating pilots about the reasons for keeping a distance from the memorial, and encouraging pilots to fly in compliance with FAA regulations and advisory guidance in a manner that minimizes noise and other impacts. ▪ The staff of Coronado National Memorial will continue to require tour bus companies to comply with regulations that reduce noise levels (such as turning off engines when buses are parked). ▪ Minimize noise generated by NPS management activities by strictly regulating administrative functions such as the use of motorized equipment. Noise will be a consideration in the procurement and use of equipment by the memorial staff.	

Cultural Resource Management Requirements

Archeological Resources	
Current laws and policies require that the following conditions be achieved in units of the national park system, including Coronado National Memorial:	
Desired Condition	**Source**
Archeological sites are identified and inventoried, and their significance is determined and documented. Archeological sites are protected in an undisturbed condition unless it is determined through formal processes that disturbance or natural deterioration is unavoidable. In cases where disturbance or deterioration is unavoidable, the site is professionally documented and salvaged in consultation with the Arizona state historic preservation officer and affiliated American Indian tribes.	National Historic Preservation Act; EO 11593; Archeological Resources Protection Act; *The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation;* Programmatic Memorandum of Agreement Among the NPS, Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers (1995); *NPS Management Policies 2001;* DO 28 *Cultural Resources Management Guidelines;* List of Classified Structures; Cultural Landscape Inventory
Compliance Actions	
Archeological surveys of the entire national memorial have been completed. Of a total of 15 archeological sites listed for the memorial, the condition of 8 was reevaluated in 2001. With further review of the original data and the assistance of the archeologist in the Southern Arizona Group office, conditions will be determined for as many of the remaining 7 sites as possible, and a work plan and budget will be prepared to acquire other data as needed. The National Park Service will take the following actions to meet legal and policy requirements related to archeological sites: ▪ Treat all archeological resources as eligible for listing on the National Register of Historic Places pending a formal determination of their significance by the National Park Service and the Arizona state historic preservation office. ▪ Protect all archeological resources eligible for listing or listed on the national register; if disturbance to such resources is unavoidable, conduct formal consultation with the Advisory Council on Historic Preservation, as appropriate, and with the Arizona state historic preservation office in accordance with the National Historic Preservation Act and implementing regulations.	

Cultural Resource Management Requirements (continued)

Historic Properties	
Current laws and policies require that the following conditions be achieved in units of the national park system, including Coronado National Memorial, for historic properties (such as buildings, structures, roads, trails, and cultural landscapes):	
Desired Condition	**Source**
Historic resources are inventoried and their significance and integrity are evaluated under the criteria for the National Register of Historic Places. The qualities that contribute to the eligibility for listing or listing of historic properties on the national register are protected in accordance with the *Secretary of the Interior's Standards* unless it is determined through a formal process that disturbance or natural deterioration is unavoidable.	National Historic Preservation Act; EO 11593; Archeological and Historic Preservation Act; the *Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation;* Programmatic memorandum of agreement among the NPS, the Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers (1995); NPS *Management Policies 2001,* DO 28, *Cultural Resources Management Guidelines* (1994); the *Secretary of the Interior's Standards for the Treatment of Historic Properties, with Guidelines for the Treatment of Cultural Landscapes; List of Classified Structures; Cultural Landscape Inventory*
Compliance Actions	
The National Park Service will take the following actions to meet legal and policy requirements related to historic resources: ▪ Determine the appropriate level of preservation for each historic property formally determined to be eligible for listing or listed on the National Register of Historic Places (subject to the *Secretary of the Interior's Standards*).* ▪ Implement and maintain the appropriate level of preservation for such properties. ▪ Analyze the design elements (materials, colors, shape, massing, scale, architectural details, site details) of historic structures and cultural landscapes in the national memorial (such as buildings, bridges, trails, roads and intersections, curbing, signs, picnic tables) to guide the rehabilitation and maintenance of sites and structures.* ▪ Before modifying any historic properties on the national register, such as structures built by the Civilian Conservation Corps (CCC) along the main road, the National Park Service will consult with the Arizona state historic preservation office and the Advisory Council for Historic Preservation, as appropriate. _____ For other actions, see "Future Plans and Studies Needed," page 68. *Before undertaking any restoration of natural contours or any revegetation, the National Park Service will evaluate all human-made features such as buildings or other structures, roads, or trails to determine their eligibility for the national register, and if any are found eligible, consult with the Arizona state historic preservation office to develop a plan for treatment of these features.	

Cultural Resource Management Requirements (continued)

Ethnographic Resources	
Certain contemporary American Indian and other communities are permitted by law, regulation, or policy to pursue customary religious, subsistence, and other cultural uses of national memorial resources with which they are traditionally associated. Recognizing that its resource protection mandate affects this human use and cultural context of resources, the National Park Service plans and executes programs in ways that safeguard cultural and natural resources while reflecting informed concern for the contemporary peoples and cultures traditionally associated with them.	
Desired Condition	**Source**
Appropriate cultural anthropological research is conducted in cooperation with groups associated with Coronado National Memorial.	National Historic Preservation Act; Advisory Council for Historic Preservation implementing regulations; NPS *Management Policies 2001;* DO 28, *Cultural Resources Management Guidelines.*
The National Park Service will accommodate access to and ceremonial use of American Indian sacred sites by American Indian religious practitioners and avoid adversely affecting the physical integrity of these sacred sites.	EO 13007 on American Indian sacred sites; American Indian Religious Freedom Act
NPS general regulations on access to and the use of natural and cultural resources in units of the national park system will be applied in an informed and balanced manner that is consistent with the national memorial's purposes, does not unreasonably interfere with American Indian use of traditional areas or sacred resources, and does not result in the degradation of national memorial resources.	EO 13007 on American Indian Sacred Sites; American Indian Religious Freedom Act; NPS *Management Policies 2001*
Other federal agencies, state and local governments, potentially affected American Indians, and other communities, interested groups, the Arizona state historic preservation officer, and the Advisory Council on Historic Preservation will be given opportunities to become informed about and comment on anticipated NPS actions at the earliest practicable time.	National Historic Preservation Act; Programmatic memorandum of agreement among the NPS, the Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers (1995); EO 11593; American Indian Religious Freedom Act; Native American Graves Protection and Repatriation Act; EO 13007 on American Indian sacred sites, Presidential Memorandum of April 29, 1994, on "Government to Government Relations with Tribal Governments"; NPS *Management Policies 2001*
All agencies consult with tribal governments before taking actions that affect federally recognized tribal governments. These consultations are open and candid so that all interested parties may evaluate for themselves the potential impact of relevant proposals. The national memorial regularly consults with traditionally associated Native Americans regarding planning, management, and operational decisions that affect subsistence activities, sacred materials or places, or other ethnographic resources with which they are historically associated.	American Indian Religious Freedom Act; Presidential Memorandum of April 29, 1994 on Government to Government Relations with Tribal Governments; National Historic Preservation Act; Implementing regulations of the Advisory Council for Historic Preservation.
The identities of community consultants and information about sacred and other culturally sensitive places and practices will be kept confidential when research agreements or other circumstances warrant.	National Historic Preservation Act; NPS *Management Policies 2001*
American Indians and other individuals and groups linked by ties of kinship or culture to ethnically identifiable human remains, sacred objects, objects of cultural patrimony, and associated funerary objects will be consulted when such items may be disturbed or are encountered on national memorial lands.	NPS *Management Policies 2001*; Native American Grave Protection and Repatriation Act
(continued on next page)	

Cultural Resource Management Requirements (continued)

Ethnographic Resources (continued)
Compliance Actions
The National Park Service will take the following actions to meet legal and policy requirements related to ethnographic resources: ▪ Continue to provide access to sacred sites and national memorial resources by American Indians that is consistent with the purposes of Coronado National Memorial and the protection of the memorial's resources. ▪ Survey and inventory ethnographic resources and document their significance. ▪ Treat all ethnographic resources as eligible for listing on the National Register of Historic Places pending a formal determination of their significance by the National Park Service and the Arizona state historic preservation officer. ▪ Protect all ethnographic resources determined eligible for listing or listed on the national register. If disturbance to such resources is unavoidable, conduct formal consultation with Advisory Council on Historic Preservation, as appropriate, the Arizona state historic preservation office, and American Indian tribes in accordance with the National Historic Preservation Act and the ACHP implementing regulations and programmatic agreement. ▪ Conduct regular consultations with affiliated tribes to continue to improve communications and resolve any problems or misunderstandings that occur. ▪ Continue to encourage the employment of American Indians on the national memorial staff so as to improve communications and working relationships and encourage cultural diversity in the workplace. _____ For other actions, see "Future Plans and Studies Needed, page 68.

Museum Collections	
Current laws and policies require that the following conditions be achieved in the national memorial for museum collections:	
Desired Condition	**Source**
All museum objects and manuscripts are identified and inventoried, and their significance is determined and documented. The qualities that contribute to the significance of collections are protected in accordance with established standards.	National Historic Preservation Act; American Religious Freedom Act; Archeological and Historic Preservation Act; Archeological Resources Protection Act; Native American Graves Protection and Repatriation Act; NPS *Management Policies 2001;* DO 28, *Cultural Resources Management Guidelines*
Compliance Actions	
The National Park Service will take the following actions to meet legal and policy requirements related to collections: ▪ Inventory and catalog all the national memorial's museum collections in accordance with standards in the NPS Museum Handbook. ▪ Develop and implement a collection management program according to NPS standards to guide the protection, conservation, and use of museum objects.	

Requirements for Sustainable Design and Development

Sustainable Design and Development	
Desired Condition	**Source**
NPS and concessioner visitor facilities will be harmonious with national memorial resources, compatible with natural processes, aesthetically pleasing, functional, as accessible as possible to all segments of the population, energy-efficient, and cost-effective.	NPS *Management Policies 2001*; EO 13123, *Greening the Government through Efficient Energy Management*; EO 13101, *Greening the Government through Waste Prevention, Recycling, and Federal Acquisition*; NPS *Guiding Principles of Sustainable Design;* DO 13, *Environmental Leadership*; DO 90, *Value Analysis.*
Compliance Actions	
To achieve sustainability and reduce costs, eliminate waste, and conserve resources, the National Park Service will observe established sustainability principles, emphasizing the use of renewable energy, and will also do the following: ▪ Coronado National Memorial staff will work with appropriate experts to make the memorial's facilities and programs sustainable. Value analysis and value engineering, including life cycle cost analysis, will be preformed to examine the energy, environmental, and economic implications of proposed developments. ▪ The national memorial's staff will support and encourage suppliers, permittees, and contractors to follow sustainable practices. ▪ Interpretive programs will address sustainable practices by the national memorial and others.	

Requirements for Visitor Experience and Use of the National Memorial

Visitor Experience	
Desired Condition	**Source**
Visitor and employee safety and health are protected.	NPS *Management Policies 2001*
Visitors understand and appreciate the national memorial's values and resources and have the information necessary to adapt to the memorial's environments; they have opportunities to enjoy the memorial in ways that leave the resources unimpaired for future generations.	NPS Organic Act; NPS *Management Policies 2001;* DO 22, *Fee Collection*
Recreational uses in the memorial are promoted and regulated, and basic visitor needs are met in keeping with the purposes of Coronado National Memorial.	NPS Organic Act; Title 36 of the Code of Federal Regulations (CFR 36); NPS *Management Policies 2001*
To the extent feasible, facilities, programs, and services in the national memorial are accessible to and usable by all people, including those with disabilities.	Americans with Disabilities Act; Architectural Barriers Act; Rehabilitation Act; NPS *Management Policies 2001*
Visitors who use federal facilities and services for outdoor recreation may be required to pay a greater share of the cost of providing those opportunities than the population as a whole.	NPS *Management Policies 2001;* 1998 Executive Summary to Congress; Recreational Fee Demonstration Program, Progress Report to Congress: Vol. I, Overview and Summary (USDI, NPS, USFWS, BLM; USDA, USFS)
The Coronado National Memorial staff has identified implementation commitments for visitor carrying capacities for all areas of the national memorial.	1978 National Parks and Recreation Act (PL 95-625), NPS *Management Policies 2001*
Compliance Actions	
These laws, regulations, and policies leave considerable room for judgment about the best mix of types and levels of visitor activities, programs, and facilities. Therefore, most decisions related to visitor understanding and use are addressed in the alternatives. The National Park Service will take the following kinds of actions to meet legal and policy requirements related to visitor experience and visitors' use of the national memorial: ▪ Provide opportunities for visitors to understand, appreciate, and enjoy Coronado National Memorial (management directions are explored in the alternatives within this broad policy). ▪ Continue to enforce the regulations governing visitor use and behavior in 36 CFR. ▪ Ensure that all programs and facilities of the national memorial are accessible to the extent feasible. ▪ After the approval of the *Final General Management Plan*, undertake detailed planning to establish visitor carrying capacity strategies and monitoring programs.	

Requirements for Right-of-Way and Telecommunication Infrastructure

Right-of-Way and Telecommunication Infrastructure	
Desired Condition	**Source**
The resources of Coronado National Memorial or the public's enjoyment of the national memorial are not denigrated by nonconforming uses. Telecommunication structures are permitted in the memorial to the extent that they do not jeopardize its mission and resources. No new nonconforming use or rights-of-way will be permitted through the national memorial without specific statutory authority and approval by the director of the National Park Service or his representative, and such uses will be permitted only if there is no practicable alternative to such use of NPS lands.	Telecommunications Act; 16 USC 79; 23 USC 317; 36 CFR 14; NPS *Management Policies 2001;* DO 53A, *Wireless Telecommunications*; Reference Manual 53, *Special Park Uses*
Compliance Actions	
The National Park Service will take the following kinds of actions to meet legal and policy requirements related to rights-of-way and the telecommunication infrastructure: ▪ According to the Telecommunications Act of 1996, accommodate requests of telecommunication companies for the use of property, rights-of-way, and easements to the extent allowable under the NPS mission. ▪ The enabling legislation for Coronado National Memorial emphasizes the need for protecting the views of the Coronado Expedition's route along the San Pedro river as the primary mission of the memorial. Any use of the memorial's lands for telecommunication infrastructures could occur *only* if this use would not affect the memorial's ability to accomplish its mission of preserving those historic views.	

IMPACT TOPICS

Impact topics are used to focus discussion, assess the potential environmental consequences of each alternative, and compare the alternatives' consequences. Impact topics were selected for analysis by determining which resources or elements of the human environment would be affected by the actions of each alternative.

Impact topics were identified on the basis of federal laws, regulations, and executive orders (such as the National Environmental Policy Act and NPS *Management Policies 2001*) and such sources as federal legislation, executive orders, and the regulations of the Council on Environmental Quality (CEQ) for implementing the National Environmental Policy Act (CEQ 1978). Other topics that must be considered are listed in *Director's Order #12 and Handbook* (NPS 2001b). Also useful in identifying impact topics was NPS knowledge of limited or easily affected resources.

Other impact topics were identified on the basis of regional or memorial-specific concerns, or as a result of scoping. (*Scoping* is seeking public interest, concerns, and ideas about the management of a unit of the national park system.) A brief rationale for the selection of each impact topic is given below.

Natural Resources

The planning team selected several natural resource impact topics. The selection was based on the major values or issues the team identified early in the planning process, as well as on applicable laws and executive orders (see appendix B). Natural resource topics are air quality; cave resources; soils; vegetation; threatened, endangered, or sensitive species; water quality; and wildlife.

Cultural Resources

Cultural resource impact topics were selected on the basis of major values identified in the memorial's enabling legislation, values identified in the scoping process, and applicable laws and executive orders pertaining to cultural resources (the 1966 National Historic Preservation Act and the National Environmental Policy Act). The topics are archeological resources, historic structures, ethnographic resources, and cultural landscapes.

Visitor Understanding and Recreational Resources

The planning team identified visitor understanding as an important issue that could be appreciably affected by the implementation of the alternatives. Impact topics in this category are visitor access to the memorial's resources, visitor access to orientation and interpretive information, and visitors' experience of the resources.

The Socioeconomic Environment

The planning team selected three impact topics related to the socioeconomic environment. The selection was based on the major values or issues that the team identified early in the planning process, as well as on applicable laws and executive orders. The topics identified were recreational use of Coronado National Memorial, grazing, and the local and regional economy.

IMPACT TOPICS DISMISSED FROM FURTHER CONSIDERATION

Resources and environmental concerns that either would not be affected or would be negligibly affected by the alternative actions were eliminated from further consideration and comparative analysis. Other topics were dismissed because they were not identified as concerns by regulators, the public, or other stakeholders during scoping. Impact topics that were dismissed from further consideration are outlined below, as are the justifications for each dismissal.

Natural Resource Topics

Water Quantity. The Upper San Pedro Partnership is "a consortium of agencies and organizations formed in 1998 to facilitate and implement sound water resource management and conservation strategies in the Sierra Vista Sub-Watershed of the San Pedro River." The partnership's purpose is to "coordinate and cooperate" in identifying, assigning priorities, and implementing comprehensive policies and projects to help meet water needs in the Sierra Vista subwatershed.

The partnership has established as its highest priority the development of an Upper San Pedro conservation plan, with a goal of ensuring that an adequate long-term groundwater supply will be available to meet the reasonable needs of current and future area residents and property owners, as well as the needs of the San Pedro Riparian National Conservation Area. Coronado National Memorial is in the Sierra Vista sub-watershed and is a member of the San Pedro Partnership. The National Park Service will continue to work with the partnership to meet its stated priorities, as follows:

- developing an Upper San Pedro conservation plan
- supporting and assisting member agencies in continuing the implementation of their existing plans, including efforts to reduce consumption, reuse/recharge effluent, and recharge stormwater
- supporting the collection and analysis of scientific data that will improve the ability to make informed decisions on the best projects and policies to accomplish the partnership's planning goal

Regardless of the management alternative chosen, there would be little effect on the hydrology or quality of the memorial's water resources, largely because water is an extremely limited resource in the memorial. Practices are already in place to optimize water use, protect water quality, and maximize the conservation and reuse of water. For example:

- The well that the national memorial uses is at or near capacity. Regardless of the alternative selected, a study will be required to determine if additional conservation measures can adequately meet the memorial's slowly growing water needs or whether another solution such as an additional well is needed.
- The memorial's wastewater is treated by a leachfield, from which it percolates into the ground to recharge the groundwater. This practice would continue, regardless of which alternative was selected.

The National Park Service has requested a federally reserved water right of 10 acre-feet per year. This request is being considered as part of the current Upper San Pedro River Basin adjudication process. If granted, adjudication would legally give the memorial the right to use 10 acre-feet per year (1 acre foot = 326,000 gallons) from any combination of state and federal water sources located on the memorial's lands. This quantity of water would be sufficient for current activities and would allow for development over the next 50 years. Once a federal reserve water right has been established, it is unlikely that additional water resources would be made available to the memorial without a new adjudication request (NPS Water Resources Division, W. Hanson, pers. comm. 2002).

State-Listed Wildlife of Special Concern. Wildlife of special concern are identified as species whose occurrence in Arizona is or may be in jeopardy, or with known or perceived threats or population declines, as described by the Arizona Game and Fish Department (AZ G&F Dept. 1996). The barking frog *(Eleutherodactylus augusti)* is considered a species of concern because of its limited distribution and threats to its habitat from road expansion and the development of recreation and administrative sites.

The presence of barking frogs at Coronado National Memorial was confirmed in 1993 (USGS and U. of AZ 1997). They inhabit rocky limestone areas of the memorial, some of which are in the Joe's Spring grazing allotment. In recent surveys, barking frogs also were heard in other locations in the Huachuca Mountains (NPS 2001b). The results of the recent surveys indicate that the number of known locations of calling male frogs has increased since the surveys of the early 1990s.

The Arizona Game and Fish Department considers the elegant trogon *(Trogon elegans)* a special concern species. These brightly colored solitary forest birds are quiet when perched, flutter in the air to pick small fruit, and also consume insects. They live in high-elevation pine and pine-oak forests, sometimes with madrone and Arizona sycamore riparian woodland, in the southwestern United States. They are migrants in the mountain ranges of southeastern Arizona (Kunzmann, Hall, and Johnson 1998). Elegant Trogons often nest in abandoned woodpecker cavities in trees. They breed from the mountains of southern Arizona (rare or irregular in the Huachucas, Santa Ritas, and Chiricahuas) to Costa Rica (Peterson 1961). They have been sighted in the memorial over the years between May and November; however, their occurrence can be considered rare (SW Parks and Monuments Assn. 1993).

These species are not federally listed as endangered or threatened, and they are not candidates for listing. Therefore, they do not have any protections beyond those afforded to other species of wildlife and birds, and they were not considered in detail in the evaluation of the effects of the alternatives. The actions of the alternatives would not be likely to occur in areas suitable for barking frog habitat. The elegant trogon may pass through the national memorial, but it is considered a transient. Construction activities and noise that would occur under some alternatives might disturb the elegant trogon or preclude it from foraging in construction areas; however, the actions would not permanently displace this species from the memorial.

Despite the lack of federal listing, it is NPS policy to protect state-listed and candidate species. Therefore, during the implementation of this plan, site-specific surveys would be conducted before any disturbance could take place in habitat suitable for either the barking frog or the elegant trogon. If either species was found, the proposed action would be relocated, or other mitigation would be arranged to prevent adverse effects on individuals or their habitat.

Prime or Unique Agricultural Lands. According to the Natural Resources Conservation Service, U.S. Department of Agriculture, (K. Maguire, pers. comm. 2001), none of the soil types occurring in the memorial is prime or unique agricultural soil. Prime farmland has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Unique land is land other than prime farmland that is used for the production of specific high-value food and fiber crops. Both categories require that the land be available for farming uses. The lands in Coronado National Memorial are not available for farming and therefore do not meet the criteria for prime or unique agricultural lands.

Ecologically Critical Areas. Coronado National Memorial does not contain any designated ecologically critical areas, wild and scenic rivers, or other unique natural resources, as referred to in 40 CFR 1508.27.

Wetlands. Wetlands that would meet the Clean Water Act criteria as jurisdictional wetlands do not occur within the area affected by actions associated with the alternatives. Therefore, this impact topic was eliminated from further consideration. The areas affected by the alternatives do consist of riparian vegetation composed of western honey mesquite–mixed short tree woodland association (PMT) and Arizona sycamore–Arizona walnut–oak riparian forest association (PJQ). The effects

of management activities on riparian vegetation have been analyzed under the vegetation impact topic.

Wilderness. There is no designated wilderness area within Coronado National Memorial. It has been determined that no areas of the memorial are suitable for wilderness designation (see appendix C).

Floodplains. Federal agencies are directed by EO 11988, *Floodplain Management* to reduce the risk of flood loss, minimize the impact of floods on human safety, and evaluate the potential effects of any actions taken in a floodplain. In addition, this executive order requires that federal structures and facilities be constructed in accordance with the standards of the National Flood Insurance Program.

The national memorial does not lie within a designated floodplain, and Federal Emergency Management Agency maps indicate that no analysis of flood hazards has been conducted in or around Coronado National Memorial. Occasional intense summer thunderstorms contribute to the possibility of flash flooding in the memorial. High water in ephemeral streams and dry arroyos could occur periodically; these events would be transient and highly variable. The occurrence rate or severity of these flash floods could not be affected by any of the alternatives, and none of the actions of the alternatives would increase the potential for downstream flooding or amplify the flood hazard. Therefore, floodplains are not evaluated in this document.

Lightscape/Night Sky. Parks are required by NPS *Management Policies 2001* to "preserve to the greatest extent possible the natural lightscapes of parks, which are natural resources and values that exist in the absence of human-caused light." The agency is developing the Night Sky Initiative to formulate a policy for protecting views of the stars and planets in our national parks. To meet this directive, the use of lighting would be restricted to areas where security and safety are required. Wherever possible, overnight lighting would not be used. If night lighting was needed, low-impact techniques would be used and shields would be installed to prevent the degradation of the night sky view, protect cave resources, and avoid disrupting the physiological processes of plants and animals. None of the alternatives would be likely to affect the appreciation of the night sky or interfere with activities of nocturnal creatures, including bats. For these reasons, lightscape and night sky have been dismissed from further consideration.

Soundscape. NPS managers are directed by NPS DO 47, *Soundscape Preservation and Noise Management*, to protect, maintain, or restore natural soundscapes unimpaired by inappropriate or excessive noise. In this directive, noise is defined as appropriate or inappropriate relative to the purpose of the park, the level of visitor services available, and the activities pursued by visitors. None of the alternatives would introduce long-term inappropriate noise levels to the memorial. The actions would occur in areas with an existing level of development, including, roads, trails, and visitor facilities. The temporary nature of noise produced during construction or revegetation and restoration would be appropriate in the developed environment and would not cause adverse effects on the human or natural environment. None of the actions in the alternatives would introduce inappropriate noise to remote or undeveloped portions of the memorial, and no action would appreciably alter the baseline ambient noise level.

Cultural Resource Topics

Museum Collections. The memorial's museum collections are housed and maintained at several locations outside the memorial boundaries. Most are in storage at the Western Archeological and Conservation Center in Tucson, AZ. Botanical specimens are housed primarily at Arizona State

University, with mammal, herpetological, and botanical collections being stored at Arizona State University and the University of Arizona. Some historical and ethnographic objects are displayed at the visitor center, and archival collections are kept in the administrative offices. None of the alternatives would affect the present dispositions of storage of the collections, nor would their care, maintenance, or access by researchers be affected. For these reasons, museum collections have been dismissed from further consideration.

Hazardous Materials

No hazardous materials are known to exist in the memorial.

Energy Requirements and Conservation Potential

The management policies of the National Park Service direct parks to plan, site, construct, and operate facilities to conserve energy and reduce pollution. Any new facility should include consideration of energy efficiency and minimal consumption of nonrenewable fuels. The construction in the action alternatives would integrate the components of energy conservation and efficiency mandated under NPS policy. Neither the no-action alternative nor any of the action alternatives would measurably affect local or regional energy consumption; therefore, energy requirements and conservation potential have been dismissed as a topic for further consideration.

Mining Areas

The memorial contains no active mining claims. There are 62 openings in 8 mining areas, and mitigation to reduce safety hazards is required at 23 of the openings. This work is underway and continues as funds become available. The mitigation is an operational issue; therefore, it is outside the scope of this document. It has been determined that some of the mines have historic qualities. Some of them are described in the "Affected Environment" chapter.

Indian Trust Resources

According to the American Indian Trust Fund Management Reform Act of 1994 and President Clinton's "Memorandum for the Heads of Executive Departments and Agencies" dated April 29, 1994, it is required that agencies determine the effects on tribal trust resources caused by federal government plans, projects, programs, and activities. One definition of tribal trust resources (from Secretarial Order 3206, Babbitt, June 5, 1997, subsection B, section 3) is as follows:

> Those natural resources, either on or off Indian lands, retained by or reserved by or for Indian tribes through treaties, statutes, judicial decisions, and executive orders, which are protected by a fiduciary [trust] obligation on the part of the United States.

None of the lands in Coronado National Memorial are trust resources according to this definition; therefore, this topic has not been analyzed.

Land Use Trends

The federal government is the primary landowner in Arizona and in Cochise County. Only 41% of Cochise County is privately owned. The land east of the memorial is predominantly agricultural, but increasingly more agricultural lands are being converted to residential use. The 2001 *Southern San Pedro Valley Area Plan*. envisions future growth in the region, with zoning proposed for commercial development. Although some alternatives would result in more visitation and staffing over time, the need for increased commercial services or residential development in the county would be negligible. The economic effects of more visitation and the elimination of grazing in the memorial are discussed under "Effects on the

Socioeconomic Environment." None of the alternatives in this plan would conflict with current land uses in the region or with uses prescribed by any regionwide plans. Therefore, impacts on land use and trends will not be analyzed.

Conservation Potential and Requirements for Natural or Depletable Resources

None of the alternatives would result in the extraction of resources from the memorial. As noted under "Servicewide Laws and Policies," page 13, under all the alternatives, the staff of the national memorial would apply ecological principles to ensure that the memorial's natural resources would be maintained.

Environmental Justice

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

For the purpose of fulfilling EO 12898, in the context of the National Environmental Policy Act, the planning team assessed the alternatives presented in this plan during the planning process. The team determined that none of these alternatives would result in significant direct or indirect negative or adverse effects on any minority or low-income population or community. The following information contributed to this conclusion:

- There would be no direct or indirect negative or adverse health effects on any minority or low-income population or community.
- The effects on the natural and socio-economic environment that would result from any alternative would not cause disproportionate adverse effects on any minority or low-income population or community.

The planning team actively solicited public participation in the planning process and gave equal consideration to all input from people, regardless of age, race, income status, or other socioeconomic or demographic factors.

Coronado National Memorial employees have consulted and worked with the American Indian tribes in the area and will continue to do so in cooperative efforts to improve communications and resolve any problems that might occur.

Transportation and Access

The topic of transportation and access will not be discussed in this document because several access routes are available, and no impacts on access to the memorial would be expected. In view of the high level of service on the road leading to the memorial, the relatively low density development proposed by the *Southern San Pedro Valley Area Plan*, and the modest increase in development considered in the alternatives in this management plan, none but modest increases would be expected in the number of vehicles using AZ 92 to Palominas.

The average annual daily traffic (AADT) for the main memorial road (five-year average) is 104. The peak flow on the main road is 300 vehicles per day.

ALTERNATIVES, INCLUDING THE PREFERRED ALTERNATIVE

INTRODUCTION TO THE ALTERNATIVES

This chapter contains descriptions of the five alternatives. Alternative A, the "no-action" (status quo) alternative, which is described first, reflects existing conditions and serves as a basis for comparing and evaluating the other alternatives. Then the four "action" alternatives (B, C, D, and E), which propose the future direction for Coronado National Memorial, are described.

Alternative B is the National Park Service's preferred alternative. In the process used to select the preferred alternative, the planning team found that alternative B would best safeguard the resources and scenic values of Coronado National Memorial while making those resources easily accessible for visitors. The cultural and natural values of the memorial would be protected in this alternative, and the visitor experience would be enhanced.

Before the action alternatives were developed, information was gathered about the resources in the national memorial. Information about the issues and the scope of the project was solicited from the public, other agencies, special interest groups, and memorial staff through newsletters, meetings, and personal contacts. This helped with the development of the action alternatives. All the alternatives are intended to support the memorial's mission, purpose, and significance and to address issues; avoid unacceptable resource impacts; and respond to public desires and concerns.

DECISION POINTS

Three decision points were identified during this process. They are phrased as questions that each alternative must answer, as follows:

- What level of development should be allowed while still preserving the memorial's cultural and natural resources unimpaired for future generations?
- What visitor use should be accommodated while preserving the integrity of the resources and maximizing visitor services?
- What is the best way to tell the public the story of Coronado National Memorial while not neglecting significant resources within the authorized boundaries?

These preliminary concepts were presented to the public for review in spring 2001. Following the public review, an evaluation process called "Choosing by Advantages" was used to compare the four alternatives and to develop the National Park Service's preferred alternative (see appendix D). The other preliminary alternatives were subsequently refined to reflect a similar level of detail as that developed for the preferred alternative.

In the following pages, the use of management prescriptions for each alternative is described, with a table outlining the general types of activities that could occur in those areas. Then the alternatives are described. The descriptions of the four action alternatives are organized by management prescriptions.

PRIORITIES WITHIN ALTERNATIVES

Priorities have been assigned to the actions discussed for each alternative; that is, certain actions would be implemented first (as having primary priority), with others implemented later according to the time likely to be needed to develop facility plans, obtain construction funding, and/or reach necessary partnership agreements. For the purposes of organization and comparison, existing conditions are shown as having primary priority, with some other actions given secondary priority.

The potential environmental effects of implementing each alternative are presented in the "Environmental Consequences" chapter.

Although a general management plan contains the analysis and justification for future funding, the plan in no way guarantees that money will be forthcoming. This *General Management Plan* will establish a vision of the future that will guide the year-to-year management of Coronado National Memorial, but the full implementation of a plan could take a number of years.

IMPLEMENTATION COSTS

The general gross costs listed for each alternative are rough estimates of the implementation costs to be used only for comparing the alternatives; they cannot be used for budgetary purposes. The costs were developed with the use of conceptual-type estimates for fiscal year 2001 (FY 01). After a final plan is selected and the memorial is closer to implementing individual actions, more detailed and accurate cost estimates will need to be developed. All implementation costs have been rounded to the nearest thousand dollars.

CARRYING CAPACITY

The General Authorities Act for the National Park Service, section 604, amended section 12(b), requires that general management plans establish a carrying capacity for a unit of the national park system, saying, among other things, that there must be "identification of an implementation commitment for visitor carrying capacities for all areas of the [national park system] unit . . . ." In addition, there also is a requirement in the NPS *Management Policies 2001* that general management plans address the issue of visitor carrying capacity. The use of the concept of carrying capacity in planning infrastructure and visitor management programs would be expected to result in effective and efficient management.

Visitor Experience and Resource Protection

Currently, visitor use has had few adverse effects on the resources of Coronado National Memorial. Illegal trafficking in people and drugs in this border area has adversely affected the visitor experience, and the memorial continues to address the issue of illegal activities through operational actions. As visitor numbers increase, it is expected that the potential for adverse effects natural and cultural resources also would increase. Large numbers of visitors at one time also could affect the visitor experience. Therefore, it is important for the National Park Service to be proactive in preventing problems that could result from visitors' use of the memorial.

While carrying capacities are being determined during the implementation of this plan, the memorial staff will monitor resources and visitor use and judge whether or not the capacities (desired conditions) are being exceeded in any area. It is not likely that the expected levels of facility development and visitation and the expected types of use would cause unacceptable impacts on the desired visitor experience or on the memorial's resources. However, if carrying capacities were exceeded, the NPS staff would take actions to restore conditions to acceptable levels. For example, the number of visitors could be restricted or facilities could be modified.

For the life of this plan, visitation would be controlled by the number and quality of facilities, by management actions, and through cooperative local efforts and initiatives. The National Park Service's visitor experience and resource protection (VERP) process would guide planners and managers in addressing carrying capacity and assessing impacts on resources and the visitor experience. The process would enable the staff to avoid some of the problems that other areas have experienced when visitation has not been managed to protect the resources or the quality of the visitor experience.

The Coronado National Memorial staff has identified desired conditions for various areas. In picnic areas, the desired condition would be to have minimal impact on natural resources, with the areas shaded by native vegetation. These areas would be managed to allow for a mix of young and mature trees and shrubs. Visitor groups would be managed not to exceed the number of tables and grills available. Off-road parking would not be allowed.

The visitor center would be designed and managed to accommodate individuals and small groups, even when larger groups were present, and to help them to understand the memorial's story. Adequate areas would be developed for interpretive programs and media that would tell the stories of the memorial's natural and cultural resources. Adequate space for cars and recreational vehicles would be available in the area near the visitor center. Resources would be preserved by not allowing off-road parking or the development of "social" roads.

Coronado Cave and the trail to the cave would be managed to minimize speleothem damage, dust in the area, and trash along the trail and in the cave. Visitors would have an opportunity to understand the cave's ecosystem.

Montezuma Pass, the trail to Montezuma Peak, and the rest of the memorial's trails would be managed to minimize trash and erosion and to discourage the creation of "social" trails. Visitors would have opportunities to understand the memorial's natural resources, to see views related to the story of the Coronado Expedition, to experience a variety of habitats in the memorial (such as grasslands, shrubs, and hillsides), and to participate in various recreational activities (such as birding, walking, and nature study.) All this would be done to offer a variety of trail experiences to hikers of all abilities.

After the *General Management Plan* is approved, indicators of resource conditions will be developed, as will indicators of visitor experiences and standards. Monitoring programs will be initiated to measure resource condition and the visitor experiences. The indicators will establish the maximum amount of deterioration of the quality of resources or experience that will be allowed before management action is taken. Such indicators will reflect the overall condition of the area and allow the measurement of effects on the memorial's biological, physical, and cultural resources and on the visitor experience.

Monitoring

To ensure that the memorial's desired conditions would remain as prescribed, monitoring would be carried out to evaluate resource conditions and visitor experiences. Through monitoring, the memorial staff would determine if these indicators were viable and acceptable; if not, the indicators might be modified. The process of determining how much is too much is a dynamic one. Critical to the success of this process are identifying standards and indicators and adjusting the management strategies when monitoring indicates that conditions are out of standard.

Surveys would be conducted at specific times and places to determine whether or not the desired visitor experience conditions were being met. Follow-up plans (such as a revised resource management plan) might be necessary to test these numbers. Work might be needed after this plan is approved to "fine-tune" the indicators, standards, and monitoring methods.

MANAGEMENT PRESCRIPTIONS

Management prescriptions identify management zones and define the levels of visitor use, management activities, and development. They provide a foundation for all subsequent management decisions in the national memorial. Along with the memorial's mission goals, they are the basis for establishing the

long-term goals of the memorial's strategic plan and for developing implementation plans such as resource management plans.

After the action alternatives for future conditions and management in the national memorial were developed, the planning team developed management prescriptions (management zones) that would apply — although differently — to each action alternative. For example, it is known that an area would need to be set aside for NPS offices and housing, another area would be needed for educational activities, and another where visitors could get information about the national memorial and decide what they wanted to do. Thus, four management prescriptions came into being for the national memorial: conservation, education, visitor services, and operations / special use, as shown in table 1 (p. 37).

In each prescription area, a particular combination of resource conditions, visitor understanding, and facilities and activities could take place. Each alternative would require a different application or configuration of these management prescriptions. For example, the visitor facilities in alternative B might be located in a different place than in alternative C, depending on the overall concept. One alternative's concept might call for additional visitor opportunities; thus, the visitor services management prescription might be larger in that alternative than in an alternative calling for more conservation. The configuration of the management prescriptions for each alternative was next placed on a map; this resulted in the alternative maps in this document.

When drawing boundaries for management prescriptions in the action alternatives, we considered known resource conditions. For example, we have done our best to avoid directing new uses into areas that contain sensitive natural resources.

ELEMENTS COMMON TO ALL ACTION ALTERNATIVES

Boundary Adjustments

As one of the provisions of Public Law (PL) 95-625, the National Parks and Recreation Act of 1978, Congress directed that the National Park Service consider, as part of a planning process, what modifications of external boundaries might be necessary to carry out the purposes of a unit of the national park system. After passing this act, Congress also passed PL 101-628, the Arizona Desert Wilderness Act. Section 1216 of that act directs the secretary of the interior to develop criteria to evaluate any proposed changes to the existing boundaries of individual park units, and section 1217 calls for the National Park Service to consult with affected agencies and others regarding any proposed boundary change and to provide a cost estimate of the acquisition cost, if any, related to the boundary adjustment.

To implement these provisions, NPS *Management Policies 2001* indicates that the National Park Service will conduct studies of potential boundary adjustments and may make boundary revisions as follows:

- to protect significant resources and values or to enhance opportunities for public enjoyment related to park purposes
- to address operational and management issues such as the need for access or the need for boundaries to correspond to logical boundary delineations such as topographic or natural features or roads
- to protect resources that are critical to fulfilling park purposes

NPS policies instruct that any recommendation to expand the boundaries of a unit be preceded by a determination that the added lands would be feasible to administer, considering size, configuration, ownership, cost, and other factors. Another requirement

is that other alternatives for management and resource protection must have been considered and found not to be adequate.

The present boundaries of Coronado National Memorial are sufficient to carry out its mission. The expansion of the national memorial would not meet any of the criteria for boundary revisions. It is not feasible to acquire all lands within the national memorial's viewshed because the cost would be prohibitive, and Arizona land policies prohibit this action. Instead, Coronado National Memorial would seek to identify and work with willing partners to achieve the goal of protecting the viewshed.

Wilderness Suitability

The National Park Service is required by its management policies and the 1964 Wilderness Act to evaluate all NPS units to determine what lands are suitable for inclusion in the national wilderness preservation system. This evaluation has been undertaken with the use of the following criteria taken from the 1964 Wilderness Act and NPS *Management Policies 2001*:

- The earth and its community of life are untrammeled by humans, who are visitors and do not remain.
- The area is undeveloped and retains its primeval character and influence, without permanent improvements or human habitation.
- The area generally appears to have been affected primarily by the forces of nature, with the imprint of humans' work substantially unnoticeable.
- The area is protected and managed so as to preserve its natural conditions.
- The area offers outstanding opportunities for solitude of a primitive and unconfined type of recreation.

The lands in Coronado National Memorial do not meet some of these primary suitability criteria, including "The area offers outstanding opportunities for solitude or a primitive and unconfined type of recreation" and "The area generally appears to have been affected primarily by the forces of nature, with the imprint of humans' work substantially unnoticeable." The paved main road bisects the national memorial, and most of the memorial's lands are less than 1 mile from that road, which is visible from most areas within the boundary. Road noise can be heard from most places. The one area in the national memorial that is protected from road noise is the south slope of Smuggler's Ridge, which in itself is too small an area, at several hundred acres, to constitute a high-quality wilderness area. The topography and vegetation are such that houses, roads, and "the imprint of humans' work" outside the boundaries are visible from most parts of the national memorial. (See "Appendix C: Wilderness Suitability Assessment.")

Furthermore, Forest Service and NPS managers did not consider wilderness in Coronado National Memorial a significant complement to the

Miller Peak Wilderness in Coronado National Forest, nor did they believe it would be advantageous to either agency's management of its area. Planning is still underway for a protected area in Mexico that might be adjacent to Coronado National Memorial; however, it is unlikely that a core protected area of a future Mexican reserve would be close to the national memorial. The views of Mexico played a significant role in the establishment of Coronado National Memorial, and they continue to be a focal point in telling the story of Coronado's expedition and interpreting our lasting ties to Mexico. The mission of Coronado National Memorial is to preserve those views, and the alternatives presented in this document offer various ways to protect the memorial's natural resources and viewshed and conserve them for future generations.

Protection of Visitors and Resources

In any of the action alternatives, the memorial would undertake a series of measures designed to better protect park resources and provide for enhanced visitor safety. The goal of these would be to eliminate cross-border illegal activities and to provide a sufficient law enforcement presence to deter such activities. The already existing partnerships between the Forest Service, the U.S. Border Patrol, and the Bureau of Land Management would be strengthened to provide for additional security. The memorial would continue to seek to upgrade communication capability and other equipment necessary to accomplish this task.

TABLE 1: MANAGEMENT PRESCRIPTIONS

Management Prescription	Resource Condition	Visitor Understanding	Facilities and Activities
Conservation	Management manipulation of vegetation limited to providing for seclusion, scenic vistas, or what is needed to maintain a healthy ecosystem; high degree of protection for cultural and natural resources in these areas.	Visitors could reflect on history and significance of memorial; these places, although adjacent to higher use areas, would allow a degree of solitude; few encounters with memorial staff; encounters with other visitors moderate to low, depending on time of day and season.	Access not easy because of rugged terrain and topography; activities could include resource appreciation, hiking, and horseback riding in permitted areas; primitive roads for administrative access would remain.
Education	Resource manipulation would vary by amount and intensity of physical development needed for a particular type of recreation; natural setting retained as much as possible; resources could be modified for essential visitor services, but changes would harmonize with natural and cultural environment; areas managed to provide best, most appropriate interpretation of resources; recreation would take place where effects on resources would be minimal.	Visitors could learn about memorial's important resources and reflect on its history and significance; self-guided or ranger-led experiences easily accessible; where possible without unacceptable resource impacts, visitors could interact with resources; direction and structure (trails, interpretive media, signs) provided, but some opportunities for discovery would remain; possible chances for solitude at certain times; encounters with staff and interaction with other visitors moderate.	The primary development in this prescription would be trails for interpretation; possibly benches, shade, a minimal number of signs, overlooks, wayside exhibits, self-guided activities and other interpretive media, and wildlife viewing areas; predominant activities could include seeing the resources and attending interpretive walks and talks.
Visitor Services	Resources might have been previously disturbed; either no or few significant resources present; significant resources managed according to NPS policy and legal requirements; only native vegetation species used except in interpretive exhibits.	These areas would be easily accessible and offer education and interpretation about national memorial's significant resources; visitors could contact staff easily; possibly frequent interactions with other visitors, large groups, and staff.	Development might include kiosks, a visitor center, comfort stations, first aid station, short trails, hardened parking, drinking fountains, fee collection station, pay phones, paved and unpaved roads, picnic areas — facilities could support various social activities such as picnicking, special events, other group activities.

Management Prescription	Resource Condition	Visitor Understanding	Facilities and Activities
Operations / Special Use	These areas located where limited or no significant resources or in previously disturbed areas; as much as practicable, NPS facilities in these areas would be models of best management practices and sustainable development; natural environment could be modified for NPS operations but still harmonize with surrounding environment; although environment might be highly modified, pollutants and other evidences of disturbance (stormwater runoff; dust from construction) contained and mitigated before affecting adjacent areas; facilities and operations buffered so that visitors would not see them or be disturbed by associated noise; physical footprint of NPS structures and stored material minimal; private landowners encouraged to adopt best management practices.	Visitor use limited; no visitors allowed on any private property within national memorial's boundaries; visitors only slightly aware of this prescription and its facilities; a few national memorial facilities might be showcased here to help visitors understand how the National Park Service works to develop sustainable and environmentally responsible facilities in an arid environment.	These areas could include grounds and structures used for administration and operations: housing, offices, maintenance shops and yards, indoor and outdoor storage areas, fire engine storage, employee parking, security systems, a secured law enforcement area, heating and cooling systems, phone lines, computer lines, and water supply and treatment; facilities would give staff a safe, efficient, comfortable, and aesthetic work environment; hardened circulation and parking areas appropriate here; housing would have enough space for family activities; these areas would include utility rights-of-way, administrative roads, and private property.

ALTERNATIVE A: NO ACTION (EXISTING MANAGEMENT DIRECTION)

CONCEPT

Alternative A, the no-action alternative, is presented for comparison with the "action" alternatives B, C, D, and E. In alternative A, the current management direction would continue, and there would be no significant change in the interpretation or management of the memorial.

DESCRIPTION

The administrative offices for the memorial would remain in their current location away from the visitor center. The visitor center would remain to house offices for the memorial's interpretive staff. All of the memorial's interpretive themes would be equally emphasized in this alternative. The memorial would work with Mexico to develop interpretive programs that would include activities to support Mexican and American / national memorial natural and cultural resources.

Cultural and natural resources would be managed, protected, and maintained as staff time and funding allowed. Cultural and natural resource inventory work and monitoring would continue and would be expanded if possible. The staff of the national memorial would encourage the research that is needed to "fill in the gaps." The memorial would continue not to have management prescriptions, but areas of the memorial are managed for visitor services, operations, education, and conservation.

Coronado National Memorial has acquired the remaining parcels of the Montezuma Ranch, which is in the grasslands south of the main memorial road. In all the alternatives, the property would be evaluated to determine if the ranch was eligible for listing on the National Register of Historic Places. In alternatives A, B, C, and E, the memorial staff then would work toward removing the early 20th century ranch structures to improve the views for which the memorial was established. If the structures were found eligible for listing on the national register, the National Park Service would initiate consultation with the Arizona state historic preservation office to determine what features could be removed, or documented and then removed. After the documentation was completed, the staff would work to eliminate all the ranch structures. The goal would be to remove as many of these features as possible, then to restore the natural contours of the area and revegetate it with native species. Exotic species of plants and trees that do not contribute to the cultural landscape also would be removed from the ranch area as time and funding permitted.

The abandoned powerlines and roads on memorial property would be allowed to deteriorate. If any section should prove to be a safety hazard, that portion would be removed.

The *Livestock Management Plan* (NPS 2000b) established long-term and short-term strategies for managing permitted (authorized) livestock operations. The Joe's Spring and Montezuma grazing allotments are now being managed according to that plan. This eventually will include the retirement of one or both allotments if the permittees are willing. Nonnative plants are not being seeded or planted on the allotments. No new range structures are planned for the Joe's Spring allotment, and any grazing improvement needed in the Montezuma allotment would be planned to maintain agave populations. Relative to pre "Livestock Management Plan" conditions, grazing intensity and duration have been reduced, and the season of use has been shortened by removing cattle during the agave bolting and flowering period. These

changes have improved range conditions on both allotments.

The memorial has partnering agreements to assist in law enforcement, communications, and fire protection. In addition, the national memorial continues to work with schools and other organizations to interpret the area's cultural heritage and ecosystems.

IMPLEMENTATION

Staffing

The following list of staffing (12 full-time-equivalent (FTE)* employees) reflects the current staffing at Coronado National Memorial. The FY 2001 pay scale has been used for all staffing costs.

Costs

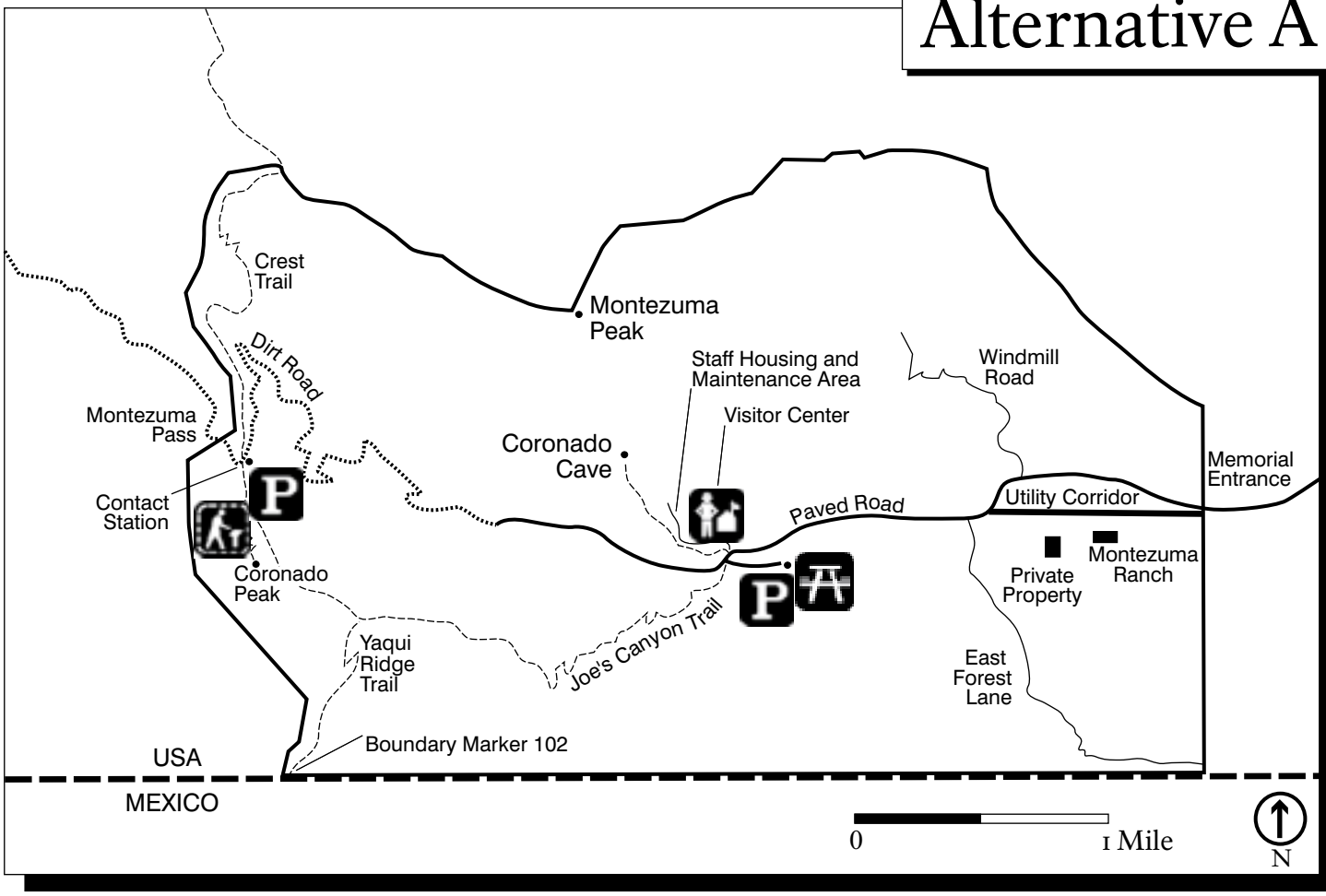
The yearly cost for administering the memorial is estimated at $740,000. This estimate is very general, in keeping with the general nature of the alternatives; the estimate should be used only for comparing the alternatives.

*FTE = full-time equivalent position; that is, one FTE (40-hours per week) position could be two employees, each working 20 hours per week, one employee working 30 hours per week and another employee working 10 hours per week, or four employees each working 10 hours per week — or other combinations.

TABLE 2: STAFFING COSTS, ALTERNATIVE A

Superintendent	1 FTE
Park ranger (protection)	5 FTE
Park ranger (biologist)	1 subject to furlough
Park ranger (interpretation)	1 FTE
Park ranger (interpretation)	1 seasonal
Resource management specialist	1 FTE
Administrative officer	1 FTE
Maintenance worker	2 FTE

Alternative A



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ALTERNATIVE B: ENHANCE OPPORTUNITIES WHILE PROTECTING RESOURCES (PREFERRED ALTERNATIVE)

CONCEPT

The concept of alternative B is to enhance educational and recreational opportunities while protecting, perpetuating, and ensuring public understanding of the national memorial's resources. Under this alternative, the National Park Service would seek to develop new ways for the public to gain an appreciation and understanding of the memorial's natural and cultural resources. Educational and interpretive goals would be emphasized.

DESCRIPTION

The description of this alternative, like the descriptions of the three other action alternatives, is organized by management prescription. The various kinds of prescription are described at the beginning of this chapter. Also see the Alternative B map.

Conservation Prescription

The conservation prescription would encompass all the lands in the memorial not included in other prescriptions. Grazing in the national memorial would be discontinued. The abandoned powerline along the road to Montezuma Pass would be removed and revegetated with native species. All existing trails would be retained, and a trail would be developed between the entrance and the visitor center. That trail would be partially in the education prescription and partially in the conservation prescription.

Education Prescription

In alternative B, the education prescription would be applied to the trail from Montezuma Pass to Coronado Peak, the trail to Coronado Cave, and the grasslands north and south of the main memorial road. The interpretation of the memorial's resources would be more intensive in these areas.

The grasslands include the Montezuma Ranch structures, which would be evaluated to determine if the ranch is eligible for listing on the National Register of Historic Places. The management of the ranch would be as described for alternative A, page 39.

East Forest Lane would continue to be used for NPS operations and as an access road to the grazing allotments. When grazing was discontinued and the road was not needed for NPS operations, it would be removed and revegetated with native species, and part of the road might be used as a trail.

A trail accessible to people with disabilities would be developed in the grasslands north of the memorial's entrance. Part of Windmill Road would be used to make this trail. In addition, a loop trail would be developed in this northern grassland area. When grazing was discontinued and Windmill Road was not needed for NPS/memorial operations, the remaining part of that road would be removed and revegetated with native species. A loop trail also would be developed in the grasslands south of the main road in the Montezuma Ranch area, possibly using part of East Forest Lane.

Any trailhead would have minimal development, possibly including a restroom. Facilities at the trailhead would be placed in areas with natural screening, or vegetative screening could be added to protect the viewshed. The trail from Montezuma Pass to Coronado Peak would be studied to determine how much of that trail could be made accessible to visitors with disabilities. The interpretive media on the trail would be rehabilitated and updated.

Visitor Services Prescription

The visitor services prescription would encompass the area around the visitor center, the parking area at the top of Montezuma Pass, and the main road through the memorial. The visitor center would be rehabilitated to offer updated interpretation of the memorial's natural and cultural resources. The memorial's interpretive themes would be presented at the visitor center and at Montezuma Pass. An annex would be added behind the visitor center to accommodate more office space, storage, and a multipurpose room to house a variety of visitor and staff activities and programs. The annex would be designed to blend into the environment and complement the architecture of the visitor center.

The visitor center is potentially eligible for listing on the National Register of Historic Places. A determination of eligibility would be carried out, and any work done on that building would be planned to protect the features that could make it eligible.

Adding the annex would require removing the interpretive trail just outside the visitor center. A trail would be developed between the memorial entrance and the visitor center. A new interpretive trail would be developed near the current picnic area. A parking area for staff and visitors (up to four buses or recreational vehicles) would be added in the picnic area across from the visitor center, and a group picnic area would be added near the site of the former fiesta area.

Even though no formal cultural landscape evaluation has been made for the visitor center area, NPS professionals have determined that it would be important to protect the views of the visitor center as approached from the parking lot.

The visitor shelter on Montezuma Pass would be converted into a minimal contact station. This might necessitate a slight expansion of the facility, but as much of the existing footprint would be used as possible. The contact station would be staffed during peak visitation times. The interpretive media at this location would be rehabilitated and updated. A small structure might be constructed in this area to house communication equipment.

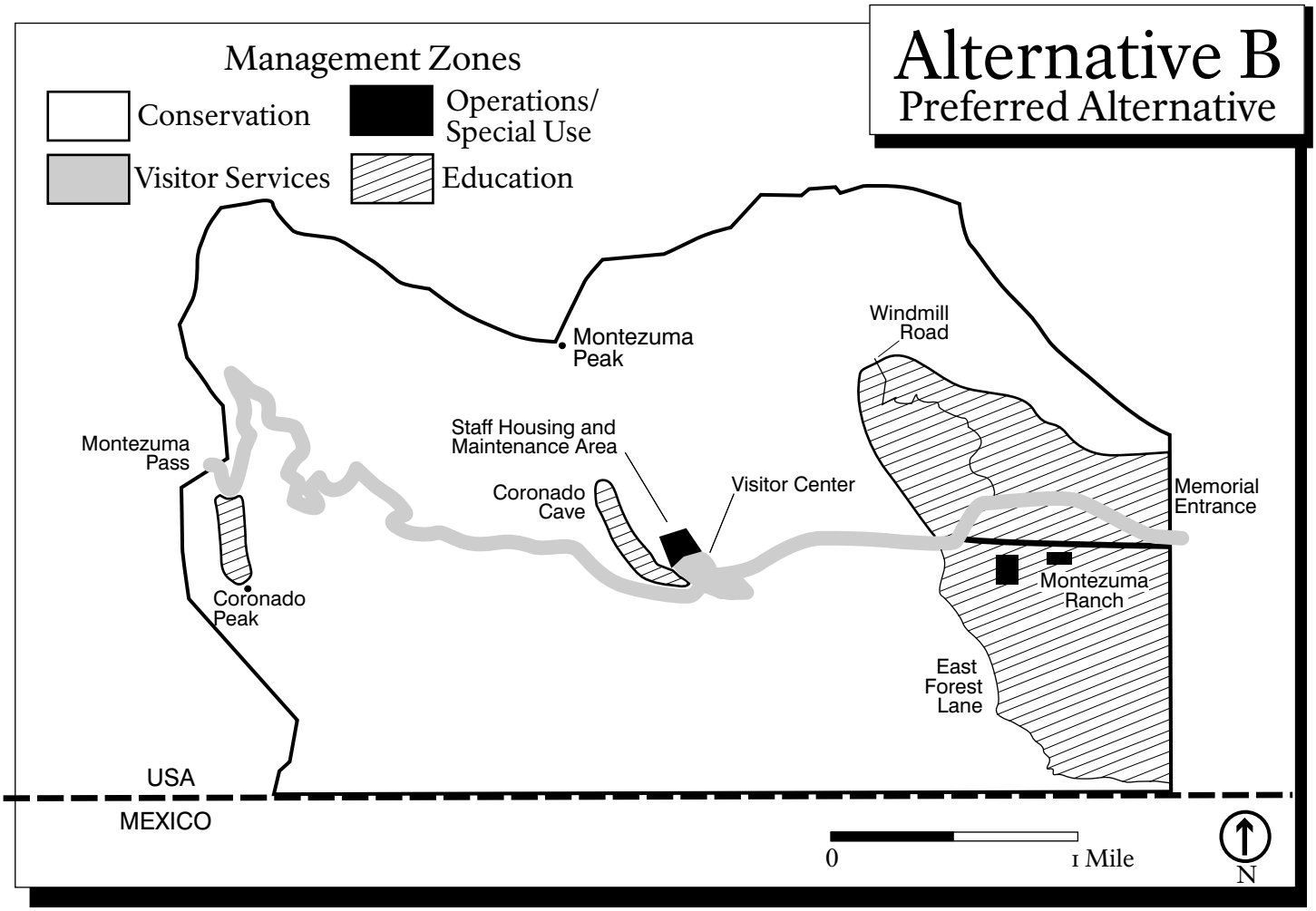
Alternative B could include a shuttle system to carry visitors between the visitor center and the contact station at Montezuma Pass. During the early years of this alternative's implementation, such a shuttle system would not be either necessary or feasible. However, in later years, it might be appropriate to establish such a shuttle service in the memorial.

Before establishing any shuttle system, the National Park Service would conduct a feasibility study. The shuttle system would be implemented only if sufficient need and economic feasibility for such a transit system in the park could be established. The feasibility study would also analyze possible approaches to shuttle system operations and maintenance, such as by the National Park Service or a concessioner, and identify the most appropriate method for implementation.

Up to three new pullouts and waysides would be developed along the main memorial road. The pullout near the end of the paved road would be expanded to accommodate a picnic area and wayside. Two more pullouts would be added along the road in locations where drivers could stop and see the memorial's scenic vistas.

Operations / Special Use Prescription

The operations / special use prescription would comprise the staff housing and maintenance area, private inholdings, and a utility corridor. The current staff housing area would remain, with the option of constructing a four-unit structure that could serve as housing for temporary employees, volunteers, researchers, and others working at the memorial for short periods. The two trailer pads would be retained, and all development would be screened from the road by vegetation.



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PARTNERSHIPS, PROGRAMS, AND ACTIVITIES

To encourage better public appreciation and understanding of its mission, the national memorial would work toward the creation of an offsite cultural festival to celebrate the various cultures associated with the memorial. Although not serving as the chief sponsor of this event, Coronado National Memorial would support its creation. For such a festival, the National Park Service would encourage emphasis on the historical aspects of the Coronado Expedition. The memorial staff would work with interested groups and organizations in Mexico to develop interpretive programs, which could include activities to support Mexican and American natural and cultural resources.

To offer opportunities for people to better understand and appreciate the memorial's story, the staff would work either separately or in cooperation with the others to promote special events inside and outside the memorial. These events could include special programs highlighting the historic event of the Coronado Expedition, the expedition's legacy, and its impact on the present American Southwest. The national memorial would expand its work with other organizations and groups to support the preservation of the regional ecosystem. This could include working with partners to preserve the views of the San Pedro Valley from Montezuma Pass.

Coronado National Forest is in the process of developing a trail outside of Coronado National Memorial. In this alternative, it is recommended that this trail should not be directly connected to trails in Coronado National Memorial but instead should be routed to end in Ash Canyon in Coronado National Forest.

IMPLEMENTATION

Priorities for Implementation

The actions proposed under this alternative, which would be implemented over the next 15 years, have been divided into primary and secondary priorities for funding and to guide implementation.

Primary Priority. Certain actions have been assigned primary priority for the following reasons:

- The action would address crucial resource protection needs.
- It would remedy serious infrastructure concerns.
- It would accommodate immediate interpretive or visitor use needs.
- It would have to be accomplished before subsequent steps could be taken.

Primary priority has been assigned to the following actions:

- inventory, document, and interpret cultural and natural resources
- cooperate with American Indian tribes in developing programs
- develop interpretive media supportive of the national memorial's interpretive themes
- rehabilitate and update the Coronado Peak trail and facilities at Montezuma Pass
- take action to keep visitation levels in line with goals while maintaining visitor experiences and resource protection
- establish management prescription areas
- work with others to develop festivals and programs celebrating the various aspects of the memorial's mission
- finish evaluating Montezuma Ranch for eligibility for the National Register of Historic Places

- restore natural contours and revegetate Montezuma Ranch
- revegetate areas around the memorial
- design and build the visitor center annex and a parking area
- develop two trails in the grassland
- discontinue grazing in the Coronado National Memorial

Secondary Priority. Secondary priority has been assigned to some actions for the following reasons:

- The action would require or would benefit from the results of primary priority actions.
- It would address intermediate priority resource protection needs.
- It would address intermediate interpretation or visitor use needs.

Secondary priority has been assigned to the following actions:

- improve parking at the picnic area
- develop new picnic facilities
- revegetate East Forest Lane if feasible
- design and build employee housing
- expand the monitoring of natural resource trends
- develop the last two new trails
- rehabilitate the visitor center
- create new pullouts and waysides

Staffing

The FY 2001 pay scale has been used for all estimates of staffing costs. This alternative would retain the current base staff of 12. Table 3 shows the additional full-time equivalents that would be needed to implement this alternative. These staffing figures represent the additional positions or upgrading of positions that would be needed to carry out alternative B. The additional positions that would be needed for this alternative are interpreters, resource specialists, maintenance workers, and administrative support staff.

Implementation Costs

The proposed construction, rehabilitation, and revegetation costs for alternative B would range from $1.8 million to $2.2 million. This estimate is general, in keeping with the general nature of this conceptual management plan and alternatives, and it should be used only for comparing the alternatives.

TABLE 3: GENERAL ESTIMATE FOR STAFFING COSTS, ALTERNATIVE B

Staffing	FTE	Costs
Existing and authorized staffing	12.0	$ 740,000
Added staff needed for primary priority actions	9.5	439,000
Total	21.5	$1,179,000

ALTERNATIVE C: FOCUS ON RESOURCE PROTECTION WHILE FULFILLING THE MEMORIAL'S MISSION

CONCEPT

The concept of alternative C is to enhance the conservation and preservation of the memorial's cultural and natural resources for future generations. Under this alternative the National Park Service would seek to minimize intrusive features on the memorial's landscape (such as modern structures, paved roads, and additional trails). Educational and interpretive goals would be accomplished by updating interpretive media and by using a more assertive outreach program.

DESCRIPTION

The description of this alternative, like the descriptions of the three other action alternatives, is organized by management prescription. The various kinds of prescription are described at the beginning of this chapter. Also see the Alternative C map.

Conservation Prescription

All the lands in the memorial not included in other prescriptions would be placed in the conservation prescription. The abandoned powerline along the road to Montezuma Pass would be removed and revegetated with native species.

Studies would be undertaken to determine the feasibility of reintroducing native species of plants and animals in the memorial that were present at the time of the Coronado Expedition. Grazing in the national memorial would be discontinued.

The Montezuma Ranch would be evaluated for eligibility for listing on the National Register of Historic Places, then managed as described for alternative A, page 39. East Forest Lane would continue as an unpaved road used for NPS operations. Abandoned roads within the memorial boundaries would be restored to natural contours and revegetated to provide for larger areas of unbroken habitat for wildlife.

Education Prescription

In alternative C the education prescription would be applied to the trail from Montezuma Pass to Coronado Peak and the trail to Coronado Cave. More intensive interpretation would be offered in these areas.

Visitor Services Prescription

The visitor services prescription would encompass the area around the visitor center, the picnic area, the parking area at the top of Montezuma Pass, and the main road through the memorial. The interior of the visitor center would be remodeled to provide more space for interpreting the memorial's natural and cultural resources.

The visitor center is potentially eligible for listing on the National Register of Historic Places. A determination of eligibility would be carried out, and any work done on that building would be planned to protect the features that could make it eligible.

Some staff positions would be relocated outside, but near, the national memorial, possibly in a leased facility. This would relieve congestion of offices and parking at the visitor center. Adequate staff office and storage space would be arranged offsite. The interpretive trail at the visitor center would be upgraded and made accessible for people with disabilities.

The picnic area and its access road would be retained. Parking for four buses or

recreational vehicles would be developed in the picnic area. The former fiesta grounds and social trails in the picnic area would be restored to natural contours and revegetated. On the road to Montezuma Pass, the dirt storage area near the end of the paved part of the main memorial road would be removed and the area restored to natural contours and revegetated. The current visitor contact facility at Montezuma Pass would be updated and rehabilitated.

Operations / Special Use Prescription

The operations / special use prescription would comprise the staff housing and maintenance area, private inholdings, and a utility corridor. The current staff housing area would remain, with the option of constructing a four-unit structure that could serve as housing for temporary employees, volunteers, researchers, and others working at the memorial for short periods. The two trailer pads would be retained, and all development would be screened from the road by vegetation.

PARTNERSHIPS, PROGRAMS, AND ACTIVITIES

To encourage better public appreciation and understanding of its mission, the national memorial would strongly emphasize reaching beyond the memorial's boundaries and working with various groups to tell the memorial's compelling story. This could be accomplished by creating partnerships with local schools (elementary to university level) and working with the U.S. Forest Service, the Bureau of Land Management, and others. The memorial staff would work with Mexican groups to develop interpretive programs, which could include activities to support Mexican and American natural and cultural resources.

Coronado National Forest is in the process of developing a trail outside of Coronado National Memorial. In this alternative, it is recommended that this trail should not be directly connected to trails in Coronado National Memorial but instead should be routed to end in Ash Canyon in Coronado National Forest.

IMPLEMENTATION

Priorities for Implementation

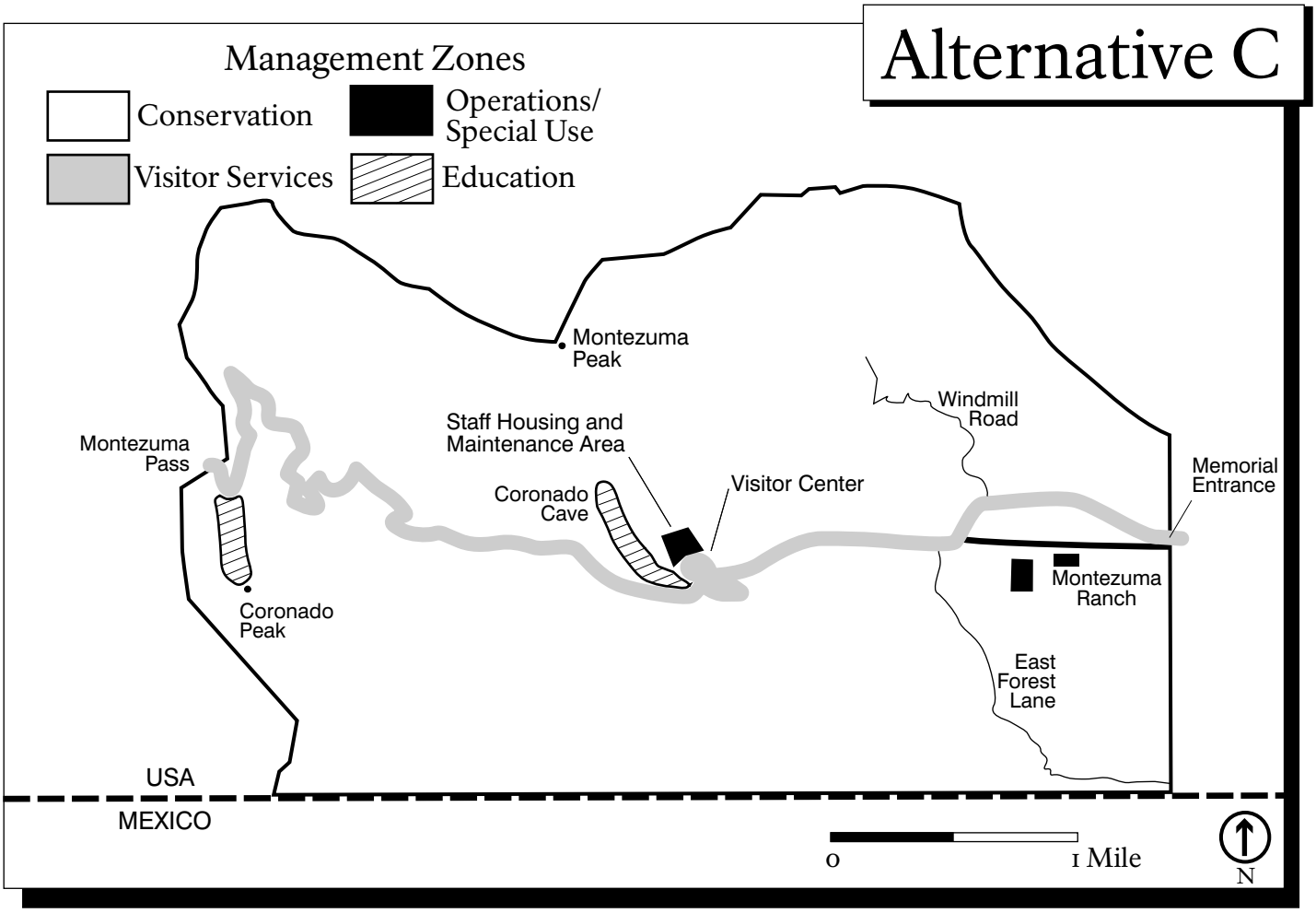
The actions proposed under this alternative, which would be implemented over the next 15 to 20 years, have been divided into primary and secondary priorities for funding and to guide implementation.

Primary Priority. Certain actions have been assigned primary priority for the following reasons:

- The action would address crucial resource protection needs.
- It would remedy serious infrastructure concerns.
- It would accommodate immediate interpretive or visitor use needs.
- It would have to be accomplished before subsequent steps could be taken.

Primary priority has been assigned to the following actions:

- inventory, document, and interpret the memorial's cultural and natural resources
- cooperate with American Indian tribes in developing programs
- develop interpretive media that will support Coronado National Memorial's interpretive themes
- rehabilitate and update trail and facilities at Montezuma Pass
- take action to keep visitation levels in line with goals while retaining visitor experiences and resource protection
- establish management prescription areas



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- study the feasibility of reintroducing native plants and animals
- rehabilitate the visitor center and move some staff offsite
- begin to develop programs with partners
- remove powerlines, restore fiesta grounds and dirt storage area; revegetate all
- finish evaluating Montezuma Ranch for eligibility for the National Register of Historic Places
- restore natural contours and revegetate Montezuma Ranch
- upgrade the interpretive trail at the visitor center and make it accessible for visitors with disabilities
- discontinue grazing on memorial lands

Secondary Priority. Some actions have been assigned secondary priority for the following reasons:

- The action would require or would benefit from the results of primary priority actions.
- It would address intermediate priority resource protection needs.
- It would address intermediate interpretation or visitor use needs.

Secondary priority has been assigned to the following actions:

- design and build employee housing
- expand monitoring of natural resource trends
- develop new bus or recreational vehicle parking in the picnic area

Staffing

The FY 2001 pay scale has been used for all estimates of staffing costs. This alternative would retain the current base staff of 12 full-time equivalents. Table 4 shows the number of additional positions that would be needed to implement this alternative. These staffing figures represent the additional positions or upgrading of positions that would be needed to carry out alternative C. The additional positions that would be needed are interpreters, resource specialists, maintenance workers, and administrative support staff.

Implementation Costs

The proposed construction, rehabilitation, and revegetation costs for alternative C would range from $1.4 million to $1.8 million. This estimate is general, in keeping with the general nature of this conceptual management plan and alternatives, and it should be used only for comparing the alternatives.

TABLE 4: GENERAL ESTIMATE FOR STAFFING COSTS, ALTERNATIVE C

Staffing	FTE	Costs
Existing and authorized staffing	12.0	$740,000
Added staff needed for primary priority actions	5.0	226,000
Total	17.0	$966,000

ALTERNATIVE D: CREATE AN INTERNATIONAL EXPERIENCE FOR VISITORS TO THE NATIONAL MEMORIAL

CONCEPT

The concept of alternative D would be to develop a fuller international experience for visitors to the memorial. The National Park Service would seek new ways for the public to gain an appreciation and understanding of the international aspects of the memorial. Educational and interpretive activities would emphasize the memorial's international aspects.

DESCRIPTION

The description of this alternative, like the descriptions of the three other action alternatives, is organized by management prescription. The various kinds of prescription are described at the beginning of this chapter. Also see the Alternative D map.

Conservation Prescription

All the lands in the memorial not included in other prescriptions would be placed in the conservation prescription. The abandoned powerline along the road to Montezuma Pass would be removed and revegetated with native species.

Abandoned roads within the memorial boundaries would be restored to natural contours and revegetated. Grazing in the Montezuma allotment would be discontinued because the new trails would result in conflicts with grazing operations.

Education Prescription

In alternative D, the education prescription would encompass the trail from Montezuma Pass to Coronado Peak, the trail to Coronado Cave, and the grasslands north of the memorial road. The interpretive media on the trail from Montezuma Pass to Coronado Peak would be rehabilitated and updated. The National Park Service would explore the feasibility of making part of the trail to Coronado Peak accessible for visitors with disabilities. More interpretive media would be developed for the trail to Coronado Cave. A new interpretive trail would be developed north of the main national memorial road in the grasslands, possibly using Windmill Road. This trail would avoid going into the Joe's Spring allotment.

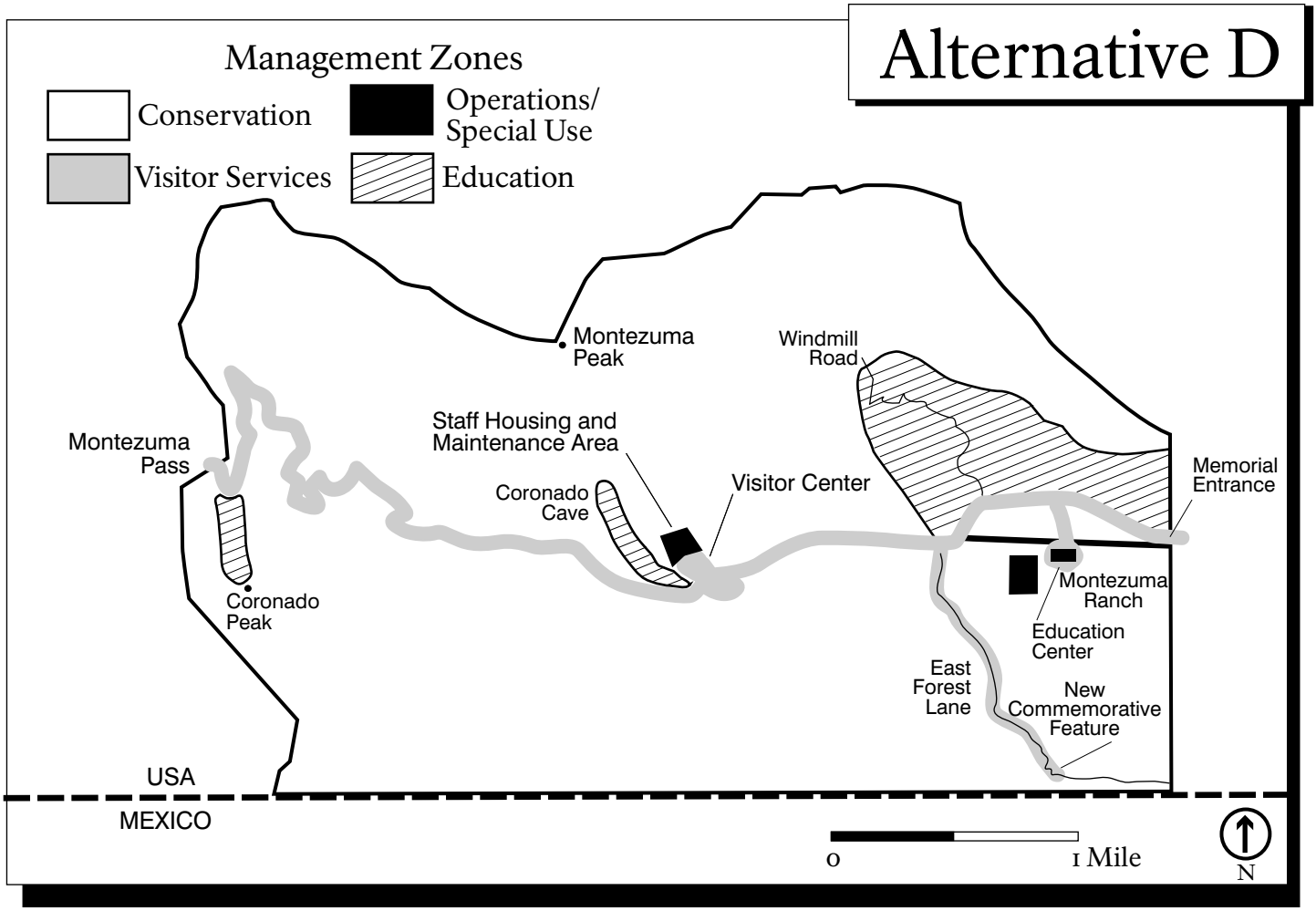
Visitor Services Prescription

The visitor services prescription would comprise the area around the visitor center, the picnic area, the parking area at the top of Montezuma Pass, East Forest Lane from the main memorial road to the border, the vicinity of Montezuma Ranch, and the main road through the memorial.

East Forest Lane, a dirt road in the grasslands south of the main memorial road that crosses an ephemeral streambed, would be upgraded to a two-lane paved road. The upgraded East Forest Lane would closely follow its current alignment.

A structure to be built at the end of East Forest Lane would be designed in a manner that would offer visitors views into Mexico. The structure would be large enough to include areas for interpretive media and protection from the sun and weather. Here, visitors would have an opportunity to understand and appreciate the Coronado Expedition, fostering international amity. This commemorative feature would become a main attraction of the memorial.

After the Montezuma Ranch structures and cultural landscapes were evaluated to determine if any would be eligible for listing



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on the National Register of Historic Places, the memorial staff would consult with the Arizona state historic preservation office to determine what features could be removed, adaptively used, or documented and then removed.

Alternative D includes the construction of an educational center in the Montezuma Ranch area, with space for some staff offices. Any structures found eligible for listing on the national register would be considered for adaptive use as part of the educational center complex. The educational center would be designed to blend into the environment, and the area around it would be landscaped in a way that would not detract from the views from Coronado Peak. An interpretive trail would be developed near the educational center. Any structures found ineligible for the national register would be demolished.

Design solutions would be used to preserve the views from Montezuma Pass into the San Pedro Valley. The roads to the educational center and the commemorative feature would be designed and built to minimize their visual impact on views from Montezuma Pass. This could include using paving materials that would blend in with the natural landscape.

The visitor center would be expanded and rehabilitated to offer updated interpretation of the memorial's natural and cultural resources, as well as containing added office and storage space. Interpretation at the visitor center would include emphasis on themes related to the memorial's international aspects. The interpretive trail at the visitor center would be removed.

The visitor center is potentially eligible for listing on the National Register of Historic Places. A determination of eligibility would be carried out, and any work done on that building would be planned to protect the features that could make it eligible.

More parking would be added for the vehicles of visitors and NPS staff; some could be in the present picnic area. The road to the picnic area would be upgraded, and picnic sites would be added in the former fiesta area.

The visitor shelter on Montezuma Pass would be converted into a minimal contact station. This might necessitate a slight expansion of the facility, but as much of the existing footprint would be used as possible. The contact station would be staffed during peak visitation times. The interpretive media at this location would be rehabilitated and updated. A small structure might be constructed in this area to house communication equipment. In addition, a smaller structure might be necessary to house communication equipment.

In the latter part of its implementation period, alternative D might include a shuttle system to carry visitors between the visitor center and the contact station at Montezuma Pass. As described in alternative B, a feasibility study would be conducted to establish the need for and economic feasibility of such a system. The feasibility study would also identify the most appropriate approach to shuttle system operations and maintenance, such as by the National Park Service or a concessioner.

A picnic area and a wayside exhibit would be added to the pullout near the end of the main memorial road.

Operations / Special Use Prescription

The operations / special use prescription would comprise the staff housing and maintenance area, private inholdings, and a utility corridor. The current staff housing area would remain, with the option of constructing a four-unit structure that could serve as housing for temporary employees, volunteers, researchers, and others working at the memorial for short periods. The two trailer pads would be retained, and all development would be screened from the road by vegetation.

PARTNERSHIPS, PROGRAMS, AND ACTIVITIES

To promote the international aspects of the memorial, the feasibility of sponsoring Coronado-related events at various universities would be explored. These might include lectures, original papers, and cultural activities, which could take place onsite or offsite.

Coronado National Forest is in the process of developing a trail outside of Coronado National Memorial. In alternative D, the National Park Service would encourage the entry of this trail into the memorial, where it could proceed down a trail to be developed paralleling East Forest Lane. It could then exit the memorial in the direction of the San Pedro River.

A hiking and horseback trail would be developed parallel to East Forest Lane. That trail would exit the memorial in the direction of the San Pedro River.

IMPLEMENTATION

Priorities for Implementation

The actions proposed under this alternative, which would be implemented over the next 15 to 20 years, have been divided into primary and secondary for funding and to guide implementation.

Primary Priority. Certain actions have been assigned primary priority for the following reasons:

- The action would address crucial resource protection needs.
- It would remedy serious infrastructure concerns.
- It would accommodate immediate interpretive or visitor use needs.
- It would have to be accomplished before subsequent steps could be taken.

Primary priority has been assigned to the following actions:

- inventory, document, and interpret the memorial's cultural and natural resources
- cooperate with American Indian tribes in developing programs
- develop interpretive media supportive of the national memorial's interpretive themes
- rehabilitate and update Coronado Peak trail and facilities at Montezuma Pass
- take action to keep visitation levels in line with goals and to maintain visitor experiences and resource protection
- establish management prescription areas
- rehabilitate and expand the visitor center
- begin to develop programs with partners
- develop a picnic area and wayside at the pullout near the end of the main national memorial road
- finish evaluating Montezuma Ranch for eligibility to the National Register of Historic Places
- restore natural contours and revegetate Montezuma Ranch
- construct an educational center at Montezuma Ranch
- discontinue grazing in the Montezuma allotment

Secondary Priority. Some actions have been assigned secondary priority for the following reasons:

- The action would require or would benefit from the results of primary priority actions.
- It would address intermediate priority resource protection needs.
- It would address intermediate interpretation or visitor use needs.

Secondary priority has been assigned to the following actions:

- pave East Forest Lane
- design and construct a commemorative feature at the end of East Forest Lane
- develop grasslands trails
- design and build employee housing
- expand the monitoring of natural resource trends
- develop new parking for buses or recreational vehicles in the picnic area

Staffing

The FY 2001 pay scale has been used for all estimates of staffing costs. This alternative would retain the current base staff of 12. Table 5 shows the additional full-time equivalents that would be needed to implement this alternative. These staffing figures represent the additional positions or upgrading of positions that would be needed to carry out alternative D. The additional positions that would be needed for this alternative are interpreters, resource specialists, maintenance workers, and administrative support staff.

Implementation Costs

The proposed construction, rehabilitation, and revegetation costs for alternative D would range from $3.5 million to $4 million. This estimate is general, in keeping with the general nature of this conceptual management plan and alternatives, and it should be used only for comparing the alternatives.

TABLE 5: GENERAL ESTIMATE FOR STAFFING COSTS, ALTERNATIVE D

Staffing	FTE	Costs
Existing and authorized staffing	12.0	$ 740,000
Added staff needed for primary priority actions	9.5	468,000
Total	21.5	$1,208,000

ALTERNATIVE E: ENHANCE INTERPRETATION AND THE EFFICIENCY OF OPERATIONS

CONCEPT

The concept of alternative E would be to offer an enhanced experience for visitors while creating a more sustainable national memorial. Under this alternative, the National Park Service would seek new ways to educate the public about the significance of the Coronado Expedition, primarily within the boundaries of the national memorial.

DESCRIPTION

The description of this alternative, like the descriptions of the three other action alternatives, is organized by management prescription. The various kinds of prescription are described at the beginning of this chapter. Also see the Alternative E map.

This alternative would involve the creation of a new visitor center, into which the educational center also would be placed. All trails in the memorial would be retained. A new interpretive trail and one other trail would be developed, as described below.

Conservation Prescription

All the lands in the memorial not included in other prescriptions would be placed in the conservation prescription. The abandoned powerline along the road to Montezuma Pass would be removed and revegetated with native species.

The grasslands south of the main memorial road include the Montezuma Ranch structures, which would be evaluated to determine if the ranch is eligible for listing on the National Register of Historic Places, then the Montezuma Ranch would be managed as described for alternative A, page 39.

Grazing in the Joe's Spring allotment would be discontinued. East Forest Lane would continue to be used for NPS operations and as an access road to the Montezuma grazing allotment.

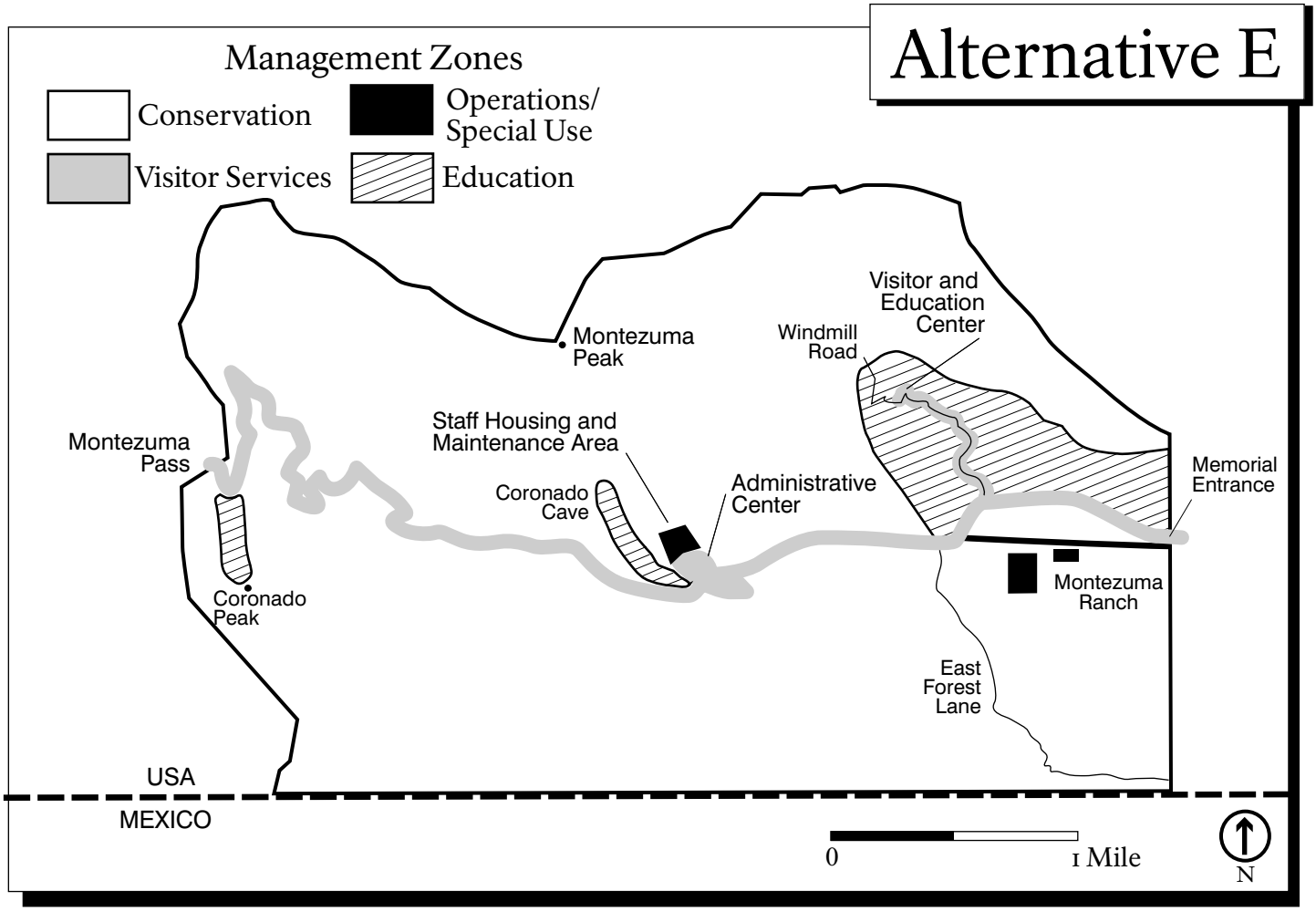
Education Prescription

The education prescription in alternative E would encompass the trail from Montezuma Pass to Coronado Peak, the trail to Coronado Cave, and the grasslands north of the memorial road. The interpretive media on the trails to Coronado Peak and Coronado Cave would be rehabilitated and updated to better explain the memorial's purpose and resources. A new interpretive trail would be developed at the new visitor and educational center to offer interpretation of the memorial's grasslands. Another trail would be developed between the current visitor center and the new visitor and educational center.

Visitor Services Prescription

The visitor services prescription in alternative E would comprise the present visitor center, the picnic area, the parking area at the top of Montezuma Pass, the main memorial road, part of Windmill Road, and the area where the new visitor and educational center would be located.

The new visitor center would be constructed about 1.2 miles west of the east entrance to the national memorial. From this location, visitors would have panoramic views of the San Pedro River Valley and the United States–Mexico border. These views would enhance the ability of the staff to tell the complete human and natural history stories significant to Coronado National Memorial.



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The educational center would be incorporated into the building, as would offices for the NPS interpretive staff. The principles of sustainable design would be used to create this building, which would blend into the environment as much as possible. Its architectural style would be typical of the Spanish colonial period. A hardened parking area for the structure would be built.

The present visitor center would be converted into administrative offices. The trailheads, parking, and restrooms would remain as at present. The picnic area would remain as at present, with social trails revegetated. The main memorial road would remain as at present; Windmill Road would be made into a two-lane paved road, with the alignment changed slightly to provide access to the new visitor and educational center.

The present visitor center is potentially eligible for listing on the National Register of Historic Places. A determination of eligibility would be carried out, and any work done on that building would be planned to protect the features that could make it eligible. The visitor shelter at Montezuma Pass would be converted into a sheltered minimal contact station. This might require a slight expansion of the structure, but the existing footprint would be used as much as possible.

In the latter part of its implementation period, alternative E might include a shuttle system to carry visitors between the visitor center and the contact station at Montezuma Pass. As described in alternative B, a feasibility study would be conducted to establish the need for and economic feasibility of such a system. The feasibility study would also identify the most appropriate approach to shuttle system operations and maintenance, such as by the National Park Service or a concessioner.

Operations / Special Use Prescription

The operations / special use prescription would comprise the staff housing and maintenance area, private inholdings, and a utility corridor. The current staff housing area would remain, with the option of constructing a four-unit structure that could serve as housing for temporary employees, volunteers, researchers, and others working at the memorial for short periods. The two trailer pads would be retained, and all development would be screened from the road by vegetation.

PARTNERSHIPS, PROGRAMS, AND ACTIVITIES

All the memorial's interpretive themes would be equally emphasized in alternative E, and strong emphasis would be placed on working with various groups to tell these stories and reach beyond the memorial's boundary. This would be done by creating partnerships with local schools (elementary to university level) and working with the U.S. Forest Service, the Bureau of Land Management, and others. The memorial staff would work with Mexican groups to develop interpretive programs, which could include activities to support Mexican and American natural and cultural resources.

Coronado National Forest is in the process of developing a trail outside of Coronado National Memorial. In alternative E, it is recommended that this trail should enter the memorial from the east and end at the new visitor and educational center.

IMPLEMENTATION

Priorities for Implementation

The actions proposed under this alternative, which would be implemented over the next 15 to 20 years, have been divided into primary and secondary priorities for funding and to guide implementation.

Primary Priority. Certain actions have been assigned primary priority for the following reasons:

- The action would address crucial resource protection needs.
- It would remedy serious infrastructure concerns.
- It would accommodate immediate interpretive or visitor use needs.
- It would have to be accomplished before subsequent steps could be taken.

Primary priority has been assigned to the following actions:

- inventory, document, and interpret the memorial's cultural and natural resources
- cooperate with American Indian tribes in developing programs
- develop interpretive media supportive of the national memorial's interpretive themes
- rehabilitate and update the Coronado Peak trail and facilities at Montezuma Pass
- take action to keep visitation levels in line with goals and to maintain visitor experiences and resource protection
- establish management prescription areas
- design and construct a new visitor center and convert the present visitor center to offices
- construct a road to the new visitor center
- discontinue grazing at Joe's Spring allotment
- begin to develop programs with partners
- finishing evaluating Montezuma Ranch for eligibility to the National Register of Historic Places
- restore the natural contours and revegetate Montezuma Ranch

Secondary Priority. Some actions have been assigned secondary priority for the following reasons:

- The action would require or would benefit from the results of primary priority actions.
- It would address intermediate priority resource protection needs.
- It would address intermediate interpretation or visitor use needs.

Secondary priority has been assigned to the following actions:

- design and build employee housing
- develop grassland trails
- expand the monitoring of natural resource trends
- develop new parking for buses or recreational vehicles in the picnic area

Staffing

The FY 2001 pay scale has been used for all estimates of staffing costs. This alternative would retain the current base staff of 12. Table 6 shows the additional full-time equivalents that would be needed to implement this alternative. These staffing figures represent the additional positions or upgrading of positions that would be needed to carry out alternative E. The additional positions that would be needed for this alternative are interpreters, resource specialists, maintenance workers, and administrative support staff.

Implementation Costs

The proposed construction, rehabilitation, and revegetation costs for alternative E would range from $4.2 million to $4.7 million. This estimate is general, in keeping with the general nature of this conceptual management plan and alternatives, and it should be used only for comparing the alternatives.

TABLE 6: GENERAL ESTIMATE FOR STAFFING COSTS, ALTERNATIVE E

Staffing	FTE	Costs
Existing and authorized staffing	12.0	$ 740,000
Added staff needed for primary priority actions	10.0	499,000
Total	22.0	$1,239,000

MITIGATING MEASURES

The following mitigating measures would be used to avoid or minimize potential impacts on natural and cultural resources from construction activities, use by visitors, and national memorial operations. These measures would apply to all alternatives.

Natural and cultural resource management activities would be integrated to avoid potential impacts from natural processes, construction, and NPS operations.

NATURAL RESOURCES

The resources of the national memorial, including air, caves, soils, vegetation, water, and wildlife, would be inventoried and monitored to avoid or minimize the effects of future development.

New facilities would be built in previously disturbed areas or in carefully selected sites with as small a construction footprint as possible.

All new developments not tied to an approved plan would be designed to be temporary and reversible. If feasible, new developments would be confined to areas outside the 100-year floodplain.

New facilities would be built on soils that are suitable for development. Soil erosion would be minimized by limiting the time that soil was left exposed and by using various erosion control measures such as erosion matting or silt fencing. Once work was completed, construction areas would be revegetated with native plants in a timely manner.

Erosion controls and other mitigating measures would be implemented to ameliorate the negative impacts of natural processes.

To prevent water pollution during construction, erosion control measures would be used, and the equipment would be regularly inspected for leaks of petroleum and other chemicals.

A runoff filtration system would be built to minimize water pollution from parking areas.

To minimize visitor-caused water pollution, interpretive displays and programs would be prepared, regulations on use would be established, and ranger patrols would be initiated when necessary.

Areas used by visitors (such as trails) would be monitored for signs of disturbance of native vegetation. To control potential impacts on plants from trail erosion or social trails, barriers would be used, and disturbed areas would be revegetated with native plants. In addition, the national memorial would practice public education and erosion control measures.

Based on recommendations by the U.S. Fish and Wildlife Service in its 1995 recovery plan for the Mexican spotted owl (USFWS 1995b), no construction activities would be conducted in protected activity centers during the breeding season.

A variety of techniques would be employed to reduce the impacts on wildlife. These could include visitor education programs, restrictions on visitor activities, and ranger patrols.

In areas proposed for development, surveys would be conducted for the presence of rare or uncommon wildlife species, and whenever possible, animals would be trapped and transferred to adjacent suitable habitat within the memorial.

Wherever possible, agaves and other native plants in construction sites would be transplanted to prevent the loss of important food

sources for nectar-feeding bats and other threatened or endangered animal species.

Integrated inventory and monitoring of natural resources would be undertaken to provide a comprehensive understanding of the memorial's wildlife, vegetation, and habitat.

CULTURAL RESOURCES

For all projects that would involve ground disturbance or would affect ethnographic resources or cultural landscapes, mitigating measures would be undertaken in consultation with the Arizona state historic preservation office and the Advisory Council on Historic Preservation.

In accordance with NPS policies and procedures, the national memorial would continue to protect cultural resources to the greatest extent possible with current funding and staffing levels. Disturbing significant resources would be avoided wherever possible. Where avoidance or preservation could not be achieved, mitigation would be carried out under the guidance of the procedures of the Advisory Council on Historic Preservation (36 CFR 800).

All unsurveyed areas in the national memorial would be inventoried for archeological, historical, and ethnographic resources and cultural landscapes. Archeological surveys would be conducted in unsurveyed areas where development was planned to determine the extent and significance of archeological resources in those areas.

To ensure the preservation of cultural landscapes in the national memorial, those landscapes would be documented and treatments would be identified as part of the implementation of the *General Management Plan*.

Wherever possible, projects and facilities would be located in previously disturbed or developed areas. Developments would be designed to avoid known or suspected archeological resources.

Project design features would be modified whenever possible to avoid effects on cultural resources. New developments would be located on sites that would blend in with cultural landscapes and would not be adjacent to ethnographic resources. If necessary, vegetative screening would be used to minimize impacts on cultural landscapes and ethnographic resources.

Archeologists would monitor ground-disturbing construction in areas where subsurface remains might be present.

"Stop work" provisions and other protective measures would be included in project documents implementing the alternatives. Construction would be restricted to the immediate vicinity of the projects, and no new disturbance would be originated outside the designated project area. If previously unknown archeological resources were unearthed during construction work, or if human remains were discovered, work in the discovery area would be stopped and a professional archeologist would make an evaluation following consultation between NPS national memorial and regional staff and the Arizona state historic preservation office.

The staff at the national memorial would consult with affiliated American Indian tribes to develop and accomplish the programs of Coronado National Memorial in a way respectful of the beliefs, traditions, and cultural values of the American Indian tribes that have ancestral ties to the lands.

The National Park Service would accommodate access to and the ceremonial use of American Indian sacred sites by American Indian religious practitioners. This would be done in a manner consistent with memorial purposes. The Park Service would avoid adversely affecting the physical integrity of these sacred sites, and would not interfere

with American Indian use of traditional areas or sacred resources.

Measures would be taken to protect human remains, sacred objects, associated funerary objects, and objects of cultural patrimony. If such items were found, the superintendent and contracting officer of the national memorial would be notified immediately. Any artifacts found in association with the remains — funerary objects, sacred objects, and objects of cultural patrimony — would be left *in situ*. If the remains were determined to be of American Indian origin, the memorial superintendent would notify the appropriate tribes according to the Native American Graves Protection and Repatriation Act (NAGPRA) and its implementing regulations. Consultation with the affected tribes would be undertaken.

All preservation, rehabilitation, and restoration efforts for historic structures would be carried out in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties, with Guidelines for Preserving, Rehabilitation, Restoring, and Reconstructing Historic Buildings*, as would the daily, cyclical, and seasonal maintenance of historic resources.

Opportunities would be provided for tribes to participate in cultural resource identification and protection activities to prevent impacts on archeological and ethnographic resources.

Through interpretive programs, visitors would be encouraged to respect tribal offerings and archeological resources and leave them undisturbed.

The staff at the national memorial would ensure that objects housed in repositories or institutions outside the national memorial would be preserved, protected, and documented according to NPS standards and procedures. The staff also would adhere strictly to NPS standards and guidelines on the display and care of artifacts. Irreplaceable items would be kept above the 500-year floodplain.

FUTURE PLANS AND STUDIES NEEDED

The development of a general management plan is the first planning step for Coronado National Memorial; it sets the overall vision and direction for the national memorial and identifies future planning needs. The following studies (not listed in priority order) are mandated by the National Park Service and will be needed to fully implement the approved *General Management Plan* for the national memorial.

Comprehensive Interpretive Plan — This plan would provide the next level of detailed planning for interpretation at Coronado National Memorial. It would expand the broader guidance in the *General Management Plan* and provide a cohesive approach toward implementation, including all media and personal services.

Cultural Landscape Report — A cultural landscape report is needed for abandoned mines and for the entire memorial's viewshed. This report would consist of three parts: (a) a cultural landscape inventory, (b) recommendations for treatment of the landscape, and (c) documentation of the actual treatment.

Ethnographic Overview and Assessment — An ethnographic overview and assessment would emphasize the review and analysis of accessible archival and documentary data on the memorial's ethnographic resources and the groups that traditionally define such cultural and natural features as significant to their ethnic heritage and cultural viability. Limited interviews and discussions with traditionally associated people would be conducted to assess and augment the documentary evidence and identify gaps in the available data.

Exhibit Plan and Design — An exhibit plan and design would serve as a guide for developing exhibits that would support the national memorial's interpretive themes. The final production-ready exhibit plan would identify museum objects and graphics to be exhibited.

Carrying Capacity Analyses — The National Park Service has developed a visitor experience and resource protection (VERP) process for addressing carrying capacity. Rather than focusing on the number of cars that can fit into a parking area, the VERP process defines the type and levels of visitor use that can be accommodated while maintaining the desired resource and social conditions that would complement the purposes of the national memorial.

Ethnographic Landscape Study and Ethnographic Resource Inventory — A field study is needed to identify and describe the names, locations, distributions, and meanings of ethnographic landscape features.

For implementing the approved plan, archeological and ethnographic surveys might be required. This would be determined individually when planning for construction was funded and undertaken.

Shuttle System Feasibility Study — If the option to undertake a shuttle service is decided on at some future point, a feasibility study would be conducted to establish the need for and economic feasibility of such a system. The feasibility study would also identify the most appropriate approach to shuttle system operations and maintenance, such as by the National Park Service or a concessioner.

ALTERNATIVES CONSIDERED BUT REJECTED

During the scoping phase of this project, some suggestions were made that have been dropped from further consideration. These were to pave the Montezuma Pass road and to provide for camping in the Coronado National Memorial.

The paving of the Montezuma Pass road would have been a costly project, would have caused considerable damage to memorial resources, and would have resulted in an adverse impact on the views from Montezuma Pass. A preliminary engineering assessment of the unpaved portion of the Montezuma Canyon road indicated that paving would have necessitated widening the road to 20 feet to accommodate two-way traffic. One option considered was to achieve a minimum 20 miles per hour driving speed; another option looked at maintaining the existing alignment but not achieving a 20 mph speed. Both of these options would have been costly, would have increased accident hazards associated with increased driving speed, and would have resulted in more visual and resource impacts. This action, which would have been contrary to the memorial's purpose, was dropped from further consideration.

Adequate camping for memorial visitors is available outside the national memorial, and in-memorial camping facilities are not necessary to accomplish the memorial's mission.

THE ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in section 101 of the National Environmental Policy Act. In the National Park Service, the environmentally preferable alternative is identified by (1) determining how each alternative would meet the criteria set forth in section 101(b) and (2) considering any inconsistencies between the alternatives analyzed and other environmental laws and policies (Director's Order 12, 2.7.E).

Alternative B, which has been selected as the preferred alternative, is also the environmentally preferable alternative for Coronado National Memorial. The criteria listed in the National Environmental Policy Act are as follows:

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

Alternative B rated high in all those categories, and it would best meet the requirements of other environmental laws and policies. Implementing alternative B would enhance the ability of Coronado National Memorial to carry out its mission through developmental and programmatic activities while limiting the impacts on the environment from any development. This would be accomplished because the existing developmental footprint would be used, and new development would be limited primarily to previously disturbed areas. Alternatives D and E, although they would enhance the visitor experience, would involve substantially more development and construction in previously undisturbed areas. Alternatives A and C would not entail new development in previously undisturbed areas, but they would not offer the diversity of individual choices available under alternative B.

Table 7 shows how each alternative would or would not fulfill the requirements of sections 101 and 102(1) of the National Environmental Policy Act. Although all the alternatives in this plan rated well (which is not surprising, since elements that were not environmentally sound were eliminated from consideration), it was found that alternative B would best protect, preserve, and enhance the historic, cultural, and natural resources of the national memorial. It also would "create and maintain conditions under which man and nature can exist in productive harmony and fulfill the social, economic, and other requirements of present and future generations of Americans" (from section 101).

TABLE 7: ENVIRONMENTALLY PREFERRED ALTERNATIVE ANALYSIS

Criterion	Alternative				
	A	**B**	**C**	**D**	**E**
Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.	1	2	1	1	2
Ensure safe, healthful, productive, and esthetically and culturally pleasing surroundings for all Americans.	2	2	2	2	2
Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.	1	2	1	2	1
Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and a variety of individual choices.	2	2	1	2	1
Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.	2	2	2	2	1
Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.	1	2	1	1	1
Total points 2 points for high (alternative fully meets the criterion) 1 point for moderate (alternative partially meets the criterion) 0 points for low (alternative does not meet the criterion)	**9**	**12**	**8**	**10**	**8**

TABLE 8: COMPARISON OF ALTERNATIVES

Alternative A: Existing Management Direction (No Action)	Alternative B: Enhance Opportunities while Protecting Resources (Preferred Alternative)	Alternative C: Focus on Resource Protection While Fulfilling Memorial's Mission	Alternative D: Create an International Experience for Visitors	Alternative E: Enhance Interpretation and the Efficiency of Operations
Concept				
Continue current management direction.	Enhance educational, recreational opportunities while ensuring public understanding of national memorial's resources; develop new ways for public to appreciate and understand the resources; emphasize educational and interpretive goals through multiple uses.	Enhance conservation and preservation of cultural and natural resources for future generations; minimize intrusive features on memorial's landscape; update interpretive media and make outreach more assertive.	Develop a fuller international experience for visitors; find new ways for public to appreciate and understand international aspects of memorial.	Offer enhanced visitor experience while making memorial more sustainable; seek new ways to educate public about significance of Coronado Expedition.
Conservation Prescription				
No management prescriptions in this alternative.	Includes all lands not in other prescriptions; retain all existing trails; develop four new trails, one of which would be in grasslands south of main road; do some restoration and revegetation to more natural state.	Includes all lands not in other prescriptions; restore abandoned roads to natural contours and revegetate with native species; study feasibility of reintroducing plants and animals present during Coronado Expedition.	Includes all lands not in other prescriptions; restore and revegetate abandoned roads in memorial.	Includes all lands not in other prescriptions; Montezuma Ranch (see below); East Forest Lane (see below).
GRAZING				
Continue managing grazing in both allotments according to *Livestock Management Plan;* eventually retire one or both allotments if permittees willing.	No grazing in the memorial.	Same as alternative B.	Continue grazing in Joe's Spring allotment; manage according to *Livestock Management Plan*.	Continue grazing in Montezuma allotment; manage according to *Livestock Management Plan*.
ABANDONED POWERLINE ALONG MONTEZUMA PASS ROAD				
Allow powerline to deteriorate; if any section becomes a hazard, remove that portion.	Remove and revegetate with native species.	Same as alternative B.	Same as alternative B.	Same as alternative B.

Alternative A: Existing Management Direction (No Action)	Alternative B: Enhance Opportunities while Protecting Resources (Preferred Alternative)	Alternative C: Focus on Resource Protection While Fulfilling Memorial's Mission	Alternative D: Create an International Experience for Visitors	Alternative E: Enhance Interpretation and the Efficiency of Operations
Education Prescription				
No management prescriptions in this alternative.	Comprises trail from Montezuma Pass to Coronado Peak, trail to Coronado Cave, grasslands north and south of main road; interpret resources more intensively in those areas.	Encompasses trail from Montezuma Pass to Coronado Peak, trail to Coronado Cave; resources more intensively interpreted in those areas.	Includes trail from Montezuma Pass to Coronado Peak (interpretive media there rehabilitated and updated), trail to Coronado Cave, grasslands north of main road; NPS would explore feasibility of making part of trail to Coronado Peak accessible for people with disabilities; Coronado trail's interpretive media improved; new interpretive trail added north of road in grassland, possibly using Windmill Road, but not in Joe's Spring allotment.	Comprises trail from Montezuma Pass to Coronado Peak, trail to Coronado Cave (interpretive media on those trails rehabilitated and updated); grasslands north of main road; new interpretive trail at new visitor and educational center; another new trail from old visitor center to new visitor and educational center.
MONTEZUMA RANCH				
Evaluate ranch for national register eligibility; if eligible, preserve contributing features and let noncontributing features deteriorate; remove any safety hazards.	Ranch would be in ***conservation prescription*** in alternative B. Evaluate ranch for national register eligibility; if eligible, consult with Arizona state historic preservation office about how to document eligible features; then eliminate structures, restore natural contours, and revegetate with native species.	Ranch would be in ***conservation prescription*** in alternative C; manage same as in alternative B.	Ranch would be in ***visitor services prescription*** in alternative D; evaluate for national register eligibility as in alternative B; educational center would be in ranch area either in adapted structures or in new structures.	Ranch would be in ***conservation prescription*** in alternative E; evaluate for national register eligibility as in alternative B, then remove structures, restore natural contours, and revegetate with native species.
EAST FOREST LANE				
No change in use of East Forest Lane.	Ranch and East Forest Lane would be in ***conservation prescription***. Continue using for NPS purposes and grazing access; when not needed and grazing ended, revegetate with native species.	East Forest Lane would be in ***conservation prescription***; it and other abandoned roads in memorial restored to natural contours and revegetated to make larger area of unbroken wildlife habitat.	Part of East Forest Lane in ***education prescription***; rest in ***visitor services prescription***; upgrade from dirt to a paved two-lane road; build a structure to commemorate Coronado Expedition.	East Forest Lane in ***conservation prescription***; would continue to be used for NPS operations and Montezuma allotment access.

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TRAILS				
No change in trails.	Develop a trail accessible to mobility impaired visitors, using part of Windmill Road and a road in Montezuma Ranch area; develop a loop trail in this area; also develop a loop trail in grasslands south of main memorial road; minimal developments on trailheads (possibly restrooms); determine if trail from Montezuma Pass to Coronado Peak can be made accessible; rehabilitate and update interpretive media on that trail. Remove interpretive trail near visitor center to accommodate annex; make new trail near current picnic area.	Only changes on trail from Montezuma Pass to Coronado Peak and trail to Coronado Cave would be more intensive interpretation, as mentioned above. Upgrade interpretive trail near visitor center and make it accessible for visitors with disabilities.	Build a new interpretive trail north of main road, possibly using Windmill Road; but not in Joe's Spring allotment; find out if trail from Montezuma Pass to Coronado Peak can be made accessible; rehabilitate and update that trail's interpretive media. Remove interpretive trail at visitor center.	Rehabilitate and update interpretive media on trails to Coronado Peak and Coronado Cave to explain memorial's purpose and resources better; develop new interpretive trail at new visitor/ educational center to interpret grasslands; add another trail between old visitor center and new visitor/ educational center. Retain interpretive trail at visitor center as it is.
Visitor Services Prescription				
No management prescriptions in this alternative.	Encompasses area around visitor center, parking area at top of Montezuma Pass, and main memorial road.	Encompasses area around visitor center, parking area at top of Montezuma Pass, and main memorial road.	Includes area around visitor center, picnic area, parking at top of Montezuma Pass, East Forest Lane from main road to border, Montezuma Ranch area, main memorial road.	Comprises area for new visitor and educational center, present visitor center, picnic area, parking area at top of Montezuma Pass, main memorial road, part of Windmill Road.
ACTIONS NEAR VISITOR CENTER				
No change in parking.	Develop parking area for up to 4 buses or RVs and 6 cars; develop new group site at former fiesta area.	Develop parking area for up to 4 buses or RVs and 6 cars; restore former fiesta area and social trails to natural contours and revegetate.	Add parking (some in current picnic area) upgrade road to picnic area; add picnic sites in former fiesta area.	No change in parking area at current visitor center.

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MAIN MEMORIAL ROAD				
No change in main road.	Develop up to three new pullouts and waysides; expand pullout near end of paved road for a few picnic tables and place for visitors to see views.	No change in main road.	Add a few picnic tables and a wayside exhibit to pullout near end of main memorial road.	No change in main road.
Operations / Special Use Prescription				
No management prescriptions in this alternative.	Includes staff housing, maintenance, private inholdings, utility corridor.	Includes staff housing, maintenance, private inholdings, utility corridor.	Includes staff housing, maintenance, private inholdings, utility corridor.	Includes staff housing, maintenance, private inholdings, utility corridor.
HOUSING AREA				
No change in housing.	No change, but option to build a 4-unit structure to house people working temporarily at memorial; retain two trailer pads; screen all development from road with vegetation.	Same as alternative B.	Same as alternative B.	Same as alternative B.
Partnerships, Programs, and Activities				
INTERNATIONAL OUTREACH				
No change.	Memorial would support creation of, but not be chief sponsor of, an offsite festival to celebrate various cultures associated with memorial; historical aspects of Coronado Expedition emphasized; staff would work with Mexican organizations to develop interpretive programs and activities to support Mexican and American cultural and natural resources.	NPS would work with Mexican groups and organizations to develop interpretive programs and activities that would support Mexican and American cultural and natural resources.	Explore feasibility of sponsoring (at various universities) Coronado-related events such as lectures and cultural activities onsite or offsite; emphasize themes related to international aspects of national memorial at visitor center, educational center, and commemorative feature.	Same as alternative C.

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ENCOURAGING UNDERSTANDING					
No change.		To help people understand memorial's story, NPS would work separately or with others to promote special events inside and outside memorial such as programs about Coronado Expedition's legacy and impact on American Southwest; NPS would expand work with others to preserve regional ecosystem.	For better public understanding of its mission, memorial would emphasize reaching beyond boundaries and working with various groups to tell its story; could include partnerships with schools (elementary to university), Forest Service, BLM.	Develop hiking and horseback trail parallel to East Forest Lane that would exit toward San Pedro River.	Equal emphasis on all interpretive themes; strongly emphasize working with groups to reach beyond boundaries to tell story; could include partnerships with schools (elementary to university), Forest Service, BLM; recommend that Coronado National Forest's developing trail enter memorial from east, ending at new visitor/educational center.
Implementation					
STAFFING					
Current FTE of 12.		Current 12 FTE, plus 9.5 more FTE needed for primary priority actions; total 21.5 FTE.	Existing 12 FTE, plus 5 more FTE needed for primary priority actions; total 17 FTE.	Existing 12 FTE, plus 9.5 more FTE needed for primary priority actions; total 17 FTE.	Existing 12 FTE, plus 10 more FTE needed for primary priority actions; total 22 FTE.
COSTS					
Staff	$740,000	$1,179,000	$966,000	$1,208,000	$1,239,000
Development	–0–	$1,800,000–$2,200,000	$1,400.000–$1,800,000	$3,500,000–$4,000,000	$4,200,000–$4,700,000

TABLE 9: COMPARISON OF EFFECTS OF THE ALTERNATIVES

Alternative A: Existing Management Direction (No Action)	Alternative B: Enhance Opportunities While Protecting Resources (Preferred)	Alternative C: Focus on Resource Protection and Fulfill Memorial's Mission	Alternative D: Create an International Experience for Visitors to National Memorial	Alternative E: Enhance Interpretation and the Efficiency of Operations
Natural Resources				
AIR QUALITY				
Alternative A would result in no measurable effects on the air quality at the memorial.	The construction activities and increased traffic from more visitation in alternative B would cause negligible local short-term adverse effects on local air quality at the memorial but would not affect regional air quality.	The construction activities and increased traffic from more visitation in alternative C would cause negligible local short-term adverse effects on local air quality at the memorial but would not affect regional air quality.	The construction and revegetation of alternative D, along with more traffic generated by increased visitation, would cause short-term negligible to minor adverse effects on local air quality at Coronado National Memorial, but the actions of alternative D would not affect regional air quality.	The construction activities and increased traffic from more visitation in alternative E would cause negligible local short-term adverse effects on local air quality at the memorial but would not affect regional air quality.
CAVE RESOURCES				
Cave resources would continue to be impacted by visitors and time with the result of a long-term minor adverse effect.	There would be beneficial effects on Coronado Cave. The intensity of these effects would be difficult to quantify before the carrying capacity is determined, but the effects would be long term and probably would be negligible to minor.	Same as alternative B.	Same as alternative B.	Same as alternative B.
SOILS				
No expansion would be planned for the visitor center vicinity. Off-road parking (mainly during peak periods) and social trails would continue to compact soils.	Expanding the visitor center and adding parking, pullouts, and new trails and trailheads would affect less than 1 acre of soils, and mitigative measures would be used. These overall effects would be negligible to minor because of the small size of the area affected, the low erosion potential of the soils, and the implementation of mitigation measures.	The impacts on soil resources from development under alternative C, such as visitor parking and trails improvements, would be long term and negligible because of the limited amount of development, the small size of the area affected (less than 1 acre), and the low soil erosion potential of the areas affected. Mitigative measures would be used to minimize erosion and to limit construction activities to the immediate area.	Expanding the visitor center and adding picnic sites with low erosion potential would result in negligible to minor adverse effects on soils because these actions would take place in small previously disturbed areas. Mitigative measures would minimize erosion and limit construction to the immediate area.	Developing a new visitor center under alternative E would result in ground disturbance, which would cause local short-term and long-term adverse effects on soils. These effects would be negligible to minor because the area affected would be small and mitigating measures would be used. Paving roads, adding parking areas, and developing trails would result in short-term and long-term negligible to minor adverse effects on soils. Those short-term effects would diminish over time with the recovery of vegetation along the road.
Removing the Montezuma Ranch structures would result in negligible to minor short-term local adverse impacts on soils. Mitigating measures would be employed to avoid or reduce effects. Restoration of this site would offset any adverse effects and result in up to minor long-term benefits.	Removing the Montezuma Ranch structures would erode and compact soils. The local adverse impacts on soils would be short-term and negligible to minor because mitigative measures would be employed to minimize erosion and limit construction activities to the immediate area. The adverse effects would be offset by beneficial effects from restoring and revegetating the site, which would improve the ecosystem's health and integrity by reducing nonnative vegetation and increasing the number of native species, a negligible to minor long-term beneficial effect. This alternative would reduce soil compaction and increase permeability and soil retention, a long-term negligible to minor beneficial effect on soil resources.	Montezuma Ranch and other areas in the memorial would be restored and revegetated under alternative C than under the other alternatives. Restoring sites would improve soil properties by reducing soil compaction and increasing permeability, causing local long-term negligible to minor beneficial effects on soils.	The short-term and long-term adverse effects on soils from paving roads, developing parking areas and trails, and developing an educational center at Montezuma Ranch would be negligible to minor because the area affected would be small, and best management practices would be used to reduce soil impacts.	Removing the Montezuma Ranch structures would result in short-term negligible to minor adverse impacts on soils, which would be offset by long-term beneficial effects from restoring and revegetating the site, which would improve soils by reducing compaction and increasing permeability. This would result in local long-term negligible to minor beneficial effects.

Alternative A: Existing Management Direction (No Action)	Alternative B: Enhance Opportunities While Protecting Resources (Preferred)	Alternative C: Focus on Resource Protection and Fulfill Memorial's Mission	Alternative D: Create an International Experience for Visitors to National Memorial	Alternative E: Enhance Interpretation and the Efficiency of Operations
No new employee housing would be developed.	The development of new employee housing would result in long-term negligible to minor adverse effects on soils, and mitigation measures would be employed to reduce erosion. Programs to interpret, document, and inventory memorial resources and uses would result in long-term negligible benefits to soils in the memorial.	Same as alternative B.	Same as alternative B.	Same as alternative B.
The effects on soils from continued grazing on the allotments would be reduced through an adaptive management approach that would monitor impacts on soils and vegetation and adjust the number of livestock accordingly. Erosion and compaction caused by continuing grazing on both allotments would result in minor adverse impacts on soils.	Eliminating grazing from the memorial would result in long-term minor beneficial effects on soils by reducing nonnative species and reestablishing native vegetation. Overall, the beneficial effects of this alternative would offset any adverse impacts associated with development.	Ending grazing in the memorial would have a long-term minor beneficial effect on soils because nonnative vegetative species would be reduced and native vegetation would increase. Overall, the beneficial effects of alternative C would offset any adverse impacts associated with the limited development.	Continuing grazing in the Joe's Spring allotment would result in minor long-term adverse impacts on soils, but they would be offset by eliminating grazing from the Montezuma allotment.	Continuing grazing in the Montezuma allotment (14% of the national memorial) would result in minor long-term adverse Impacts on soils, but they would be offset by eliminating grazing from the Joe's Spring allotment.
VEGETATION				
No expansion would be planned for the visitor center vicinity. Off-road parking (mainly during peak periods) and social trails would continue to impact vegetation.	Expanding the visitor center and adding parking, pullouts, and trailheads would affect less than 1 acre of vegetation, and mitigative measures would be used. The impacts would be negligible to minor because of the small size of the area affected, the low erosion potential of the soils, and the use of mitigation.	Adding more visitor parking would result in long-term negligible effects on vegetation because the development would be limited and the area affected would be less than 1 acre. Mitigative measures would be used to minimize erosion and to limit construction activities to the immediate area.	Expanding the visitor center and adding picnic sites with low erosion potential would result in negligible to minor adverse effects on vegetation because these actions would take place in previously disturbed areas and the areas would be small. Mitigative measures would minimize erosion and limit construction activities to the immediate area.	Developing a new visitor center would cause ground disturbance, which would lead to local short-term and long-term adverse effects on vegetation. These effects would be negligible to minor because the area affected would be small and mitigating measures would be used. Paving roads, adding parking areas, and developing trails would result in short-term and long-term negligible to minor adverse impacts on grassland vegetation. Those short-term effects would diminish over time as vegetation along the road recovered.
No new employee housing would be developed.	The development of new employee housing would result in long-term negligible to minor adverse effects on vegetation, and mitigation measures would be employed. Programs to interpret, document, and inventory memorial resources and uses would result in long-term negligible benefits to vegetation in the memorial.	Same as alternative B.	Same as alternative B.	Same as alternative B.
Removing the Montezuma Ranch structures would result in negligible to minor adverse short-term local impacts on vegetation. Mitigating measures would be used to avoid or reduce effects. Restoration and revegetation with native species would have a long-term negligible to minor beneficial effect.	Removing the Montezuma Ranch structures would result in local adverse impacts on vegetation, which would be short term and negligible to minor because mitigative measures would be used to minimize soil erosion, limit construction activities to the immediate area, and accelerate restoration of native plant species. The adverse effects would be offset by beneficial effects from restoring and revegetating the site, which would improve the ecosystem's health and integrity by reducing nonnative vegetation and increasing the number of native species, a negligible to minor long-term beneficial effect.	More areas in the memorial would be restored and revegetated under alternative C than under the other alternatives. The impacts from development under alternative C would be long term and negligible because of the limited amount of development and the small size of the area affected (less than 1 acre). Restoring sites would improve ecosystem health and integrity by reducing nonnative species and reestablishing native plant species, a long-term local negligible to minor beneficial effect on vegetation.	Individual plants would be trampled and uprooted during the paving of roads and parking areas and the development of trails. The short-term and long-term adverse impacts on vegetation from paving roads, developing parking areas and trails, and developing an educational center would be negligible to minor because the area affected would be small and best management practices would be used to reduce impacts. Only the vegetation in the area adjacent to the development would be affected. The adverse effects would diminish over time as the area revegetated.	Removing the Montezuma Ranch structures would result in short-term negligible to minor adverse impacts on vegetation. This would be offset by long-term beneficial effects from re-storing and revegetating the site, which would reduce compaction and increase permeability, resulting in local long-term negligible to minor beneficial effects.

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The impacts on vegetation from continued grazing in the allotments is being reduced through an adaptive management approach that monitors the impacts on vegetation and adjusts the number of livestock accordingly. Minor adverse impacts on vegetation, including riparian vegetation, and range condition would result from erosion and compaction caused by continuing grazing on both allotments. However, modifying grazing management according to the *Livestock Management Plan* will improve range conditions compared to those that existed before the plan was implemented.	Ending grazing in the memorial would result in long-term minor beneficial effects on vegetative communities and range condition by reducing nonnative species and reestablishing native vegetation. Overall, the beneficial effects of this alternative would offset any adverse impacts associated with development.	Eliminating grazing from the memorial would have a long-term minor beneficial effect on vegetation and range condition because nonnative vegetative species would be reduced and native vegetation would increase. Overall, the beneficial effects of this alternative would offset any adverse impacts associated with the limited development.	Grazing in the Joe's Spring allotment would continue to adversely affect vegetation in the memorial, but the minor long-term adverse effects would be offset by the beneficial effects from ending grazing in the Montezuma allotment.	Continuing grazing in the Montezuma allotment (14% of the memorial) would result in minor long-term adverse impacts on vegetation, but they would be offset by eliminating grazing from the Joe's Spring allotment.
THREATENED, ENDANGERED, AND SENSITIVE SPECIES				
Programs to interpret, document, and inventory memorial resources and uses would result in a long-term negligible benefits to threatened and endangered or sensitive species in the memorial.	Enhanced programs to interpret, document, and inventory memorial resources and uses would result in a long-term negligible benefits to threatened and endangered or sensitive species in the memorial.	Same as alternative B.	Same as alternative B.	Same as alternative B.
Current maintenance and operations activities would continue to have a negligible impact on wildlife.	Enlarging the visitor center and adding trails, parking areas, and pullouts would cause indirect effects on lesser long-nosed bats, Mexican long-tongued bats, and loggerhead shrikes by disturbing vegetation and small mammals that are food sources for the shrikes. The developments would not measurably affect the population of agaves, a food source for the lesser long-nosed bat and the Mexican long-tongued bat, nor would it alter the populations of small mammals in grassland habitats, which are the prey base of loggerhead shrikes. The development activity near the visitor center would occur in pine-oak-juniper forests that is primary foraging habitat of the Mexican spotted owl. These actions would take place in areas previously disturbed and frequently used by visitors. The owls often avoid those areas. The developments in owl foraging habitat outside the protected activity center would be short-term, indirect, and negligible and would not be not likely to adversely affect the species.	Adding parking for buses and recreational vehicles would not affect the long-nosed bat, the Mexican long-tongued bat or the loggerhead shrike because these actions would not take place in the grassland areas of the memorial, where the predominant forage for these species is found. The developments would be placed in owl foraging habitat outside the protected activity centers, and they would be in areas already used by visitors, so it is likely that the owls avoid these areas when foraging. Therefore, the effects from the developments would be short-term, indirect, and negligible, and these species would not be likely to be adversely affected. Removing powerlines in the proposed protected activity center for the Mexican spotted owl at a time not in the owl's breeding season might cause the owls to avoid the area when foraging but it would not adversely affect the species.	The development-related activities of alternative D north of the main memorial road would not alter the population of agave plants, which are the food source of the lesser long-nosed and Mexican long-tongued bats. However, individual plants might be disturbed by building trails in grasslands or by paving roads and parking areas. These activities would not alter the populations of small mammals and reptiles that are the prey base of the loggerhead shrike There might be indirect negligible effects, but it is not likely that there would be adverse effects on these species. The developments north of the main memorial road would not be in prime Mexican spotted owl foraging or nesting habitat, and the availability of the owl's prey species in this area is low. Therefore, the developments of alternative D would not be likely to adversely affect the Mexican spotted owl.	The ground-disturbing activities of developing buildings and trails and more road access into grasslands north of the main road would disturb vegetation and small mammals and reptiles. This would indirectly affect the lesser long-nosed bat, the Mexican long-tongued bat, and the loggerhead shrike, but it is unlikely that these species would be adversely affected. The activities and developments of alternative E would take place in areas unsuited for Mexican spotted owl nesting and foraging habitat; there-fore, implementing alternative E might affect, but would be unlikely to adversely affect, the Mexican spotted owl.

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Removing the Montezuma Ranch structures would disturb a small area, and the effects would be short-term and local, causing negligible to minor adverse effects on the populations of either agaves that are a food source for nectar-feeding bats or small mammals that are prey for the loggerhead shrike. The adverse effects to listed species would be negligible. The ranch area is not in prime foraging or nesting habitat for the Mexican spotted owl, and there is low availability of the owl's prey species in this location; therefore, removing the ranch structures would not adversely affect these owls.	Removing the Montezuma Ranch structures would disturb about 25 acres (less than 1% of the memorial's acreage), causing negligible to minor adverse effects on the food base of the lesser long-nosed bat, the Mexican long-tongued bat, and the loggerhead shrike. Therefore, removing the structures might indirectly affect but would not be likely to adversely affect those listed or sensitive species. The ranch area is not in prime foraging or nesting habitat for the Mexican spotted owl, and there is low availability of the owl's prey species in this location; therefore, removing the ranch structures would not be likely to adversely affect this species.	Removing the Montezuma Ranch structures would disturb a small area and might result in the loss of individual agave plants, the food base of the lesser long-nosed and Mexican long-tongued bat. The action also might displace prey species of the loggerhead shrike. Therefore, removing the structures might indirectly affect but would not be likely to adversely affect these listed or sensitive species. The ranch area is not in prime foraging or nesting habitat for the Mexican spotted owl, and there is low availability of the owl's prey species in this location; therefore, removing the ranch structures would not be likely to adversely affect the Mexican spotted owl.	Adapting the Montezuma Ranch structures for use as an educational center or removing them and building new buildings would disturb agave plants and small mammals that are food sources for loggerhead shrikes, lesser long-nosed bats, and Mexican long-tongued bats, resulting in negligible to minor indirect effects on these species. Adapting the structures would not be likely to adversely affect these species.	Removing the Montezuma Ranch structures and restoring and revegetating the area would result in more habitat for agave plants and more ground cover and habitat for small rodent species. This would indirectly benefit nectar-feeding bats and loggerhead shrikes by increasing their available food.
Restoring and revegetating the ranch area might result in more agave plants, increasing the available food for nectar-feeding bats. Revegetating the area probably would increase the habitat and prey species of the loggerhead shrikes. Thus, there would be beneficial effects on the lesser long-nosed bat, the Mexican long-tongued bat, and the loggerhead shrike, and the restoration would not be likely to adversely affect these species. Because of the small portion of the national memorial affected, this alternative might affect the lesser long-nosed and Mexican long-tongued bat and the loggerhead shrike but would not be likely to adversely affect these species.	Restoring and revegetating the ranch area after removing the structures might increase the number of agave plants, resulting in more available food for nectar-feeding bats. Revegetating the area probably would increase the habitat and prey species of the loggerhead shrikes. Thus, there would be beneficial effects on the lesser long-nosed and Mexican long-tongued bat and the loggerhead shrike, and the restoration would not be likely to adversely affect these species. Because only a small part the memorial would be affected, this alternative might affect the lesser long-nosed and Mexican long-tongued bats and the loggerhead shrike but would not be likely to adversely affect these species.	Same as alternative B	Restoring and revegetating the ranch area after the area is developed as an educational center would result in about the same number of agave plants as currently. Revegetation of the area probably would maintain the habitat and prey species of the loggerhead shrikes. Thus there would be long-term, negligible effects on these species.	Same as alternative B.
It is unlikely that Mexican spotted owls use the grazing allotments. Continued grazing in the memorial under alternative A, with the use of the *Livestock Management Plan*, would not be likely to adversely affect this species.	It is unlikely that Mexican spotted owls use the grazing allotments; therefore discontinuing grazing would not likely affect these owls.	Same as alternative B.	It is unlikely that Mexican spotted owls use the grazing allotments. Therefore, gazing associated with this alternative would not be likely to adversely affect this species.	It is unlikely that Mexican spotted owls use the grazing allotments. Therefore, gazing associated with this alternative would not be likely to adversely affect this species.
Alternative A also would not be likely to adversely affect the endangered lesser long-nosed bat.	Alternative B would not be likely to adversely affect the endangered lesser long-nosed bat.	Ending grazing in the memorial would have a negligible effect on nectar-feeding bats but would not be likely to adversely affect these species	Grazing associated with alternative D would have a negligible effect on nectar-feeding bats and would not be likely to adversely affect the lesser long-nosed bat.	Continuing grazing in the Montezuma allotment would continue negligible to minor adverse effects on vegetation and wildlife on which listed or sensitive species rely for food and habitat. Implementing alternative E would not be likely to adversely affect the lesser long-nosed bat.
Livestock grazing in the memorial under alternative A might adversely affect the loggerhead shrike by adversely affecting prey habitat for species that the loggerhead shrike relies on. These effects would be negligible.	Eliminating grazing from the memorial might increase the prey base and nesting habitat for loggerhead shrike. It would have a negligible effect on the lesser long-nosed and Mexican long-tongued bat.	Ending grazing in the memorial might increase the prey base and nesting habitat for loggerhead shrikes.	Continued grazing on the Joe's Spring allotment would disturb the food sources of the loggerhead shrike, indirectly affecting this species.	Continuing grazing in the Montezuma allotment would continue negligible to minor adverse effects on vegetation and wildlife on which listed or sensitive species rely for food and habitat.

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WATER QUALITY				
No new employee housing would be developed.	No adverse effects on water quality would be anticipated from developing additional employee housing. The establishment of monitoring programs in the memorial to monitor activities such as grazing would benefit overall water quality in the memorial.	Same as alternative B.	Same as alternative B.	Same as alternative B.
Current memorial maintenance and operation actions would continue to result in a gradual, long-term beneficial impact on the memorial's water quality.	Adding an annex to the visitor center and developing new parking, pullouts and trailheads would affect less than 1 acre, resulting in long-term negligible to minor adverse impacts on water quality. Mitigative measures would be used to reduce soil erosion and the loss of vegetation along streams.	The effects on water quality from adding a few more parking spaces in an existing footprint would be negligible because the area affected would be small, the actions would not take place in riparian habitat or adjacent to a stream channel, and mitigating measures would be used to reduce impacts.	Expanding the visitor center and adding picnic sites in previously disturbed areas would result in negligible to minor effects on water quality because the development would not take place in riparian habitat or near drainages. Mitigating measures would minimize erosion and limit construction to the immediate area.	The long-term effects on water quality from developing a new visitor center would be negligible because the development would not take place in a riparian area or along drainages, and mitigative measures would reduce soil erosion.
Removing the Montezuma Ranch structures would not measurably affect water quality because the action would not be near drainages, and mitigative measures would be used to contain or reduce soil erosion. Restoration of the site would offset any adverse effects of the removal.	Removing the Montezuma Ranch structures and restoring and revegetating the area would have negligible effects on water quality. Restoring East Forest Lane and the site where powerlines would be removed would restore native riparian vegetation, reducing soil erosion and sedimentation. The long-term beneficial effects on water quality from those activities would be negligible to minor.	Removing the Montezuma Ranch structures and restoring and revegetating the area would have negligible effects on water quality. Restoring and revegetating more sites than in the other action alternatives would result in negligible to minor improvements in water quality by reducing sedimentation into drainages. Ending grazing in the memorial would result in a long-term minor beneficial effect on water quality. Overall, the beneficial effects of alternative C on water quality would offset any adverse impacts associated with the limited development.	Removing the Montezuma Ranch structures and replacing them with new buildings or adapting them for use as an educational center would not affect water quality. Paving East Forest Lane and developing trails would result in short-term minor adverse impacts on water quality because construction would increase soil erosion and sedimentation. The long-term impacts would be negligible because riparian vegetation would recover along the streambank.	Removing the Montezuma Ranch structures and restoring and revegetating the area would result in negligible long-term beneficial effects on water quality. Paving Windmill Road would result in minor long-term adverse impacts on water quality because the amount of stream channel affected would be small. Road and trail development would result in negligible to minor long-term adverse impacts on water quality.
Reducing livestock numbers consistent with the *Livestock Management Plan* is improving water quality by reducing sedimentation, fecal coliform, and other microbes, but grazing, even at reduced levels, would continue to degrade watersheds, This would cause soil erosion, decrease plant cover, and alter plant communities. The long-term adverse effects on water quality from continued grazing would be minor.	Ending grazing in the memorial would improve water quality by decreasing sedimentation and reducing fecal coliform and other microbes, a long-term minor beneficial effect on riparian habitats and water quality. Overall, the beneficial effects on water quality from this alternative would offset any adverse impacts associated with development.	Same as alternative B.	Continuing grazing in the Joe's Spring allotment would continue to affect water quality adversely through continued streambank erosion and sedimentation, but ending grazing in the Montezuma allotment would offset these effects.	Continuing grazing in the Montezuma allotment would result in minor long-term adverse impacts on riparian habitats and consequently on water quality, but the effects would be offset by eliminating grazing in the Joe's Spring allotment.
WILDLIFE				
	Programs to interpret, document, and inventory memorial resources and uses would result in a long-term negligible benefits on threatened and endangered or sensitive species in the memorial. Loss of a small portion of wildlife habitat and the potential for loss of sedentary individual animals from development of new employee housing would have long-term negligible to minor adverse effects.	Same as alternative B.	Same as alternative B.	Same as alternative B.

Alternative A: Existing Management Direction (No Action)	Alternative B: Enhance Opportunities While Protecting Resources (Preferred)	Alternative C: Focus on Resource Protection and Fulfill Memorial's Mission	Alternative D: Create an International Experience for Visitors to National Memorial	Alternative E: Enhance Interpretation and the Efficiency of Operations
Removing the Montezuma Ranch structures and restoring and revegetating the area would result in more ground cover and habitat for small rodent species. The structure removal would cause short-term negligible adverse effects on wildlife. Mitigating measures would be used to prevent or reduce the effects on rare or uncommon wildlife species. Restoring and revegetating the site with native vegetation after the structures were removed would offset the adverse impacts on soils and improve grassland habitat, benefiting wildlife species. Ongoing implementation of the *Livestock Management Plan* is improving wildlife habitat in the two allotments. However, continued grazing in the national memorial would result in minor long-term adverse impacts on some wildlife species from habitat loss and forage reduction.	Expanding the visitor center and building trails would result in more public access to wildlife habitat, resulting in negligible to minor adverse effects. Trails and roads might benefit some species by facilitating movement. Removing the Montezuma Ranch structures, with mitigating measures to reduce impacts on rare or uncommon species, would result in long-term negligible adverse effects on wildlife. Restoring the ranch area to natural contours and revegetating it would improve grassland habitat, resulting in a long-term negligible to minor benefit for wildlife species. Ending grazing in the national memorial would improve habitat and forage, benefiting wildlife.	Adding parking for buses and recreational vehicles would result in negligible effects on wildlife in the memorial. The long-term adverse effects on wildlife from removing the Montezuma Ranch structures would be negligible with the implementation of mitigating measures to reduce impacts on rare or uncommon species. Restoring and revegetating areas in the memorial would improve grassland habitat, benefiting wildlife species. Ending grazing in the memorial would improve habitat and forage, a long-term minor beneficial effect on wildlife.	The adverse effects on wildlife from expanding the visitor center and adding picnic sites in previously disturbed areas would be negligible to minor. Removing the Montezuma Ranch structures and using mitigative measures to reduce impacts on rare or uncommon species would result in long-term negligible adverse effects on wildlife. Developing trails in the memorial would result in short-term adverse effects on wildlife, but the effects would be negligible to minor because the areas affected would be small. Trails and roads might benefit some species by facilitating movement. Widening and paving East Forest Lane road, with the resultant increased visitor access, would cause long-term minor adverse local effects on wildlife from increased potential for roadkill and the continued fragmentation of habitat. These actions also would degrade the value of the drainages as migration corridors. Ending grazing in the Montezuma allotment would increase grassland forage and improve riparian habitat, resulting in long-term minor beneficial effects for wildlife.	Developing buildings, trails, and roads under alternative E would result in the loss of habitat and individual animals and the fragmentation of populations. This represents a loss of habitat value, but because the affected grassland area would be small and does not contain uncommon species, the adverse effects on wildlife would be negligible. Trails and road development might benefit individuals of some species by facilitating movement. Removing the Montezuma Ranch structures, with mitigation to reduce the adverse effects on rare or uncommon species, would result in long-term negligible adverse effects on wildlife. Restoring and revegetating the ranch area would improve grassland habitat, benefiting wildlife. Eliminating grazing from the Joe's Spring allotment would increase forage and habitat in grassland and riparian areas, a long-term beneficial effect for wildlife.
Cultural Resources				
ARCHEOLOGICAL RESOURCES				
An archeological survey would be undertaken at the Montezuma Ranch. Research and resource documentation are improving the national memorial's ability to make informed management decisions. The ongoing efforts to identify and protect archeological resources would benefit archeological resources, but such resources would be adversely affected by the continuation of grazing. The overall result would be a long-term negligible adverse impact on the national memorial's archeological resources.	New development in the national memorial under alternative B would be minor, taking place primarily in previously disturbed areas. The impacts on archeological resources would be partially or fully mitigated by sensitive siting and by designing facilities in relation to the resources. Ending grazing in the national memorial would help to conserve archeological resources. Therefore, alternative B would result in a long-term negligible to minor beneficial effect on archeological resources.	Archeological resources probably would not be affected under alternative C, with development in the national memorial limited and most of it taking place in previously disturbed areas. Therefore, alternative C would result in long-term negligible to minor beneficial effects on archeological resources.	Much of the new development in Coronado National Memorial under alternative D would be limited to previously disturbed areas. The large number of ground-disturbing actions in this alternative would increase the possibility of affecting archeological resources. Overall, the actions of this alternative would result in a long-term negligible adverse impact on archeological resources.	Much of the new development in Coronado National Memorial under alternative E would take place in previously undisturbed areas. The variety of ground-disturbing actions in this alternative would increase the possibility of affecting archeological resources. Overall, the actions of this alternative would result in a long-term negligible to minor adverse impact on archeological resources.
HISTORIC STRUCTURES				
Before taking any action regarding the Montezuma Ranch structures, the national memorial staff would pursue a formal determination of the structures' eligibility for the National Register of Historic Places. Research and resource documentation are improving the national memorial's ability to make informed management decisions. The ongoing efforts to identify and preserve historic structures would benefit these resources. The overall result would be a long-term negligible to minor beneficial effect on the memorial's historic structures.	Before taking any action regarding the visitor center or the Montezuma Ranch structures, the national memorial staff would pursue a formal determination of the structures' eligibility for the National Register of Historic Places. Research and resource documentation are improving the national memorial's ability to make informed management decisions. The ongoing efforts to identify and preserve historic structures would benefit these resources. The overall result would be a long-term negligible beneficial effect on the national memorial's historic structures.	Before taking any action regarding the visitor center or the Montezuma Ranch structures, the national memorial staff would pursue a formal determination of the structures' eligibility for the National Register of Historic Places. Research and resource documentation are improving the national memorial's ability to make informed management decisions. The ongoing efforts to identify and preserve historic structures would benefit these resources. The overall result would be a long-term negligible beneficial effect on the national memorial's historic structures.	Before taking any action regarding the visitor center or the Montezuma Ranch structures, the national memorial staff would pursue a formal determination of the structures' eligibility for the National Register of Historic Places. Research and resource documentation are improving the national memorial's ability to make informed management decisions. The ongoing efforts to identify and preserve historic structures would benefit these resources. The overall result would be a long-term negligible beneficial effect on the national memorial's historic structures.	Research and resource documentation are improving the national memorial's ability to make informed management decisions. The ongoing efforts to identify and preserve historic structures would benefit these resources. The overall result would be a long-term negligible beneficial effect on the historic structures of the national memorial.

Alternative A: Existing Management Direction (No Action)	Alternative B: Enhance Opportunities While Protecting Resources (Preferred)	Alternative C: Focus on Resource Protection and Fulfill Memorial's Mission	Alternative D: Create an International Experience for Visitors to National Memorial	Alternative E: Enhance Interpretation and the Efficiency of Operations
ETHNOGRAPHIC RESOURCES				
American Indians would continue gathering items important to their culture on the national memorial's lands. The long-term minor beneficial effect from developing inventories for ethnographic resources would be partially offset by a lack of in-depth programs, resulting in an overall long-term negligible beneficial effect on ethnographic resources.	No action or development in alternative B would affect known ethnographic resources. The various programs and partnerships that the national memorial would develop to emphasize the area's multicultural heritage would result in long-term moderate to major beneficial effects on ethnographic resources.	The lack of development in the form of trail, roads, and buildings in alternative C would protect the national memorial's ethnographic resources from disturbance. Restoring and revegetating areas of powerlines, roads, and nonhistoric structures would make more areas suitable for ethnographic use. All these actions combined would result in long-term negligible to minor beneficial effects on ethnographic resources.	The possibility of affecting ethnographic resources would be greater in alternative D than in some of the other alternatives because there would be greater access to areas of the national memorial. The actions in this alternative could result in a long-term negligible beneficial effect on ethnographic resources.	The possibility of adversely affecting ethnographic resources would be greater in alternative E than in some of the other alternatives because visitors would have more access to the grasslands in the national memorial. The actions of this alternative could have a long-term negligible adverse impact on ethnographic resources.
CULTURAL LANDSCAPES				
Until the Montezuma Ranch structures were removed, they would have short-term negligible adverse impacts on national memorial views. Development outside the national memorial could result in minor to moderate short-term and long-term adverse impacts on cultural landscapes.	The developments of alternative B would be minimal, and the impacts on cultural landscapes would be partially or fully mitigated by sensitive siting and design, augmented by other protective measures such as vegetative screening. This alternative would result in long-term minor to moderate beneficial effects on cultural landscapes.	The limited development proposed in alternative C would result in the restoration of landscapes to be representative of the time of the Coronado Expedition; therefore, this alternative would result in long-term negligible to minor beneficial effects on cultural landscapes.	The possibility of adversely affecting cultural landscapes would be greater in this alternative than in some of the other action alternatives because of the variety of actions (constructing roads, facilities, and trails) that would take place. The actions of alternative D would result in a long-term negligible adverse impact on cultural landscapes.	The possibility of adversely affecting cultural landscapes would be greater in this alternative than in some of the other action alternatives because of the variety of actions (constructing roads, facilities, and trails) that would take place. The actions of alternative E would result in a long-term negligible adverse impact on cultural landscapes.
Visitor Understanding and Recreational Resources				
Continuing the limitations on access to natural resources and cultural exhibits for mobility-impaired visitors along the memorial's trails would result in long-term negligible adverse impacts. If the demand for recreational resources continued to increase and no improvements were made, there would be local minor to moderate long-term adverse impacts on the visitor experience. Removing the Montezuma Ranch structures and restoring and revegetating the area would improve scenic values and the visitor experience from Montezuma Pass, resulting in a long-term minor beneficial effect on the visitor experience. Continued grazing in the memorial would have a long-term negligible to minor adverse impact on visitors wanting to hike in the allotments.	Improving recreational services and facilities in Coronado National Memorial would result in negligible to minor short-term and long-term beneficial effects on the visitor experience. The visitor experience also would be enhanced by resource conservation. Improving interpretive materials and expanding outreach programs that emphasize the memorial's mission, purpose, and significance would enhance the opportunities for visitors to learn about and understand the memorial's resources, a moderate long-term beneficial effect on the visitor experience. Eliminating grazing would enable visitors to experience the natural resources of the grasslands, a negligible to minor beneficial effect on the visitor experience.	Under alternative C, access via memorial trails to natural resources and cultural exhibits for visitors with disabilities would continue to be limited, a negligible to minor adverse impact. Ending grazing in the memorial would enable some visitors to use grassland areas that have been little used for recreation; however, with no trails being developed in the allotment areas, the use would remain limited. Expanding the NPS facilities would result in short-term minor to moderate adverse impacts on the visitor experience, but in the long term there would be minor to moderate beneficial effects resulting from decreased congestion and improved views. Using outreach programs alone to emphasize the memorial's interpretive themes would result in only a minor beneficial effect on visitor understanding and the visitor experience.	Under alternative D, access via memorial trails to natural resources and cultural exhibits for visitors with disabilities would increase, resulting a negligible to minor beneficial effect. Expanding the visitor center would result in short-term minor to moderate impacts on the visitor experience, but visitor congestion would decrease as a result of the added developments, resulting in long-term moderate to major beneficial effects on the visitor experience. Improving interpretive materials and expanding the outreach programs that would emphasize the mission, purpose, and significance of the national memorial would enhance the opportunities for visitors to learn about and understand the memorial's resources, a moderate to major beneficial effect on the visitor experience. The new developments would affect the viewshed, resulting in long-term minor adverse impacts on the visitor experience. Eliminating grazing from the Montezuma allotment would benefit a small number of visitors who would use the trails in the grasslands, resulting in a negligible to minor beneficial effect on the visitor experience.	Under alternative E, access via memorial trails to natural resources and cultural exhibits for visitors with disabilities would increase, resulting in minor beneficial effects. The new, larger visitor/educational center would help to disperse visitors and alleviate congestion, a long-term moderate to major beneficial effect on visitor understanding and the visitor experience. Emphasizing the memorial's interpretive themes through outreach programs alone would result in a minor beneficial effect on the visitor experience. The new developments that would affect the viewshed would result in long-term negligible adverse impacts on the visitor experience. Eliminating grazing from the Joe's Spring allotment would benefit a small number of visitors, a negligible to minor beneficial effect on the visitor experience.
Socioeconomic Environment				
RECREATIONAL USE				
Recreational use at the national memorial under alternative A would be relatively small in proportion to the total recreational demand and recreational opportunities both in Cochise County and throughout the Southwest. The effects of this alternative on recreational use would be negligible both locally and regionally.	Alternative B, the preferred alternative, would result in moderate long-term beneficial effects on recreation by accommodating more recreation than alternative A.	Improvements in facilities and resource conservation brought about by implementing alternative C — increased recreation services, improved facilities, better controls, and enhanced visitor experience — would result in minor long-term beneficial effects on recreation.	Implementing alternative D, which would involve more recreational opportunities than alternative A, would result in moderate long-term beneficial effects on recreational use.	Alternative E would result in more recreation opportunities than would be available under alternative A; this would be a moderate long-term beneficial effect on recreational use.

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GRAZING				
The long-term effects of grazing on the socioeconomic environment under alternative A would be negligible.	Ending grazing in the national memorial would result in a negligible adverse effect on the county's economy from reduced cattle production.	Eliminating grazing in the national memorial would result in a negligible long-term adverse effect on the county's economy from reduced cattle production.	Eliminating grazing from the Montezuma allotment would result in a minor long-term beneficial effect on recreational use and a negligible adverse effect on the county's economy from reduced cattle production.	Ending grazing in the Joe's Spring allotment would cause a minor long-term beneficial effect on recreational use and a negligible adverse effect on the county's economy from reduced cattle production.
LOCAL AND REGIONAL ECONOMY				
New jobs and visitor spending associated with alternative A would have negligible effects on the economy. The ability to provide additional personnel trained in fighting wildland fires would be a minor long-term beneficial effect on the region.	Implementing alternative B would result in negligible beneficial effects on the economy of Cochise County compared to alternative A. These effects would result from the direct and indirect creation of local jobs, increased spending associated with more visitation, and expenditures on construction labor and supplies. Negligible adverse effects would result from decreased cattle production. The addition of NPS staff trained in wildland fire suppression would result in a minor long-term beneficial effect on wildland fire control in the county.	Implementing alternative C would result in negligible beneficial effects on the economy of Cochise County compared to alternative A. These effects would result from the direct and indirect creation of local jobs, increased spending associated with increased visitation, and expenditures on construction labor and supplies. Negligible adverse effects would result from decreased cattle production. The addition of NPS staff trained in wildland fire suppression would result in a minor long-term beneficial effect on wildland fire control in the county.	Implementing alternative D would result in negligible beneficial effects on the economy of Cochise County compared to alternative A. These effects would result from the direct and indirect creation of local jobs, increased spending associated with more visitation, and expenditures on construction labor and supplies. Negligible adverse effects would result from decreased cattle production. The addition of NPS staff trained in wildland fire suppression would result in a minor long-term beneficial effect on wildland fire control in the county.	Implementing alternative E would result in negligible beneficial effects on Cochise County's economy compared to alternative A. These effects would result from the direct and indirect creation of local jobs, increased spending associated with increased visitation, and expenditures on construction labor and supplies. Negligible adverse effects would result from decreased cattle production. The addition of NPS staff trained in wildland fire suppression would result in a minor long-term beneficial effect on wildland fire control in the county.

AFFECTED ENVIRONMENT

NATURAL RESOURCES

GENERAL DESCRIPTION

Coronado National Memorial is in the Sierra Madrean oak/woodlands transition zone at the interface of the Sonoran and Chihuahuan Deserts. This location has produced diverse natural resources within the memorial. The Huachuca Mountains originate near the memorial and extend north for about 25 miles. To the east and west lies a vast expanse of grasslands, the San Pedro River Valley, and the San Rafael Valley. There are no dams or known hazardous materials in the memorial.

SKY ISLANDS ECOSYSTEM

The "Sky Islands" of Arizona and New Mexico and northern Sonora form a unique complex of about 27 mountain ranges whose boundaries, at their lowest elevation, are desert scrub, grasslands, or oak woodlands. The Sky Islands and Sierra Madre region have been identified as a center of diversity for several groups of species. The great diversity of the Mogollon Highlands–Sky Islands–Northern Sierra Madre Occidental network stems from its location, elevation, and history. Trending north and south between the Rocky Mountains and the Sierra Madre Occidental Mountains of Mexico, the Sky Islands are at the meeting point of temperate North American species and warm subtropical species. They straddle two floristic provinces — the Neotropic and Holarctic — and two faunal realms — the Neotropic and Nearctic. They also are at the point of convergence of three climatic zones: tropical, subtropical, and temperate. (Sky Islands Alliance, from Internet).

In southeastern Arizona, the Huachuca, Pinaleño, Chiricahua, and Santa Rita Mountains, which have elevations up to 10,000 feet, provide a variety of habitats, from deserts and grasslands through oak woodlands and pine forests.

PHYSIOGRAPHY

Vegetation in the memorial is typical of the Upper Sonoran Zone and the mountains of southeastern Arizona. It includes desert grasses and shrubs at lower elevations. At higher elevations, forests primarily are made up of oak, Mexican piñon pine, and alligator juniper. The scientific names for all the plants and animals mentioned in this document are listed in appendix E.

The Huachuca Mountains, which are partly within the national memorial boundary, consist of a primary northwest-southeast trending central ridge about 25 miles long and 4 miles wide. The central ridge is secondarily faulted and dissected by numerous canyons that drain to the east and west. Miller Peak, 2 miles north of the memorial, reaches an elevation of 9,445 feet (Wallmo 1955; Toolin 1980; Ruffner and Johnson 1991).

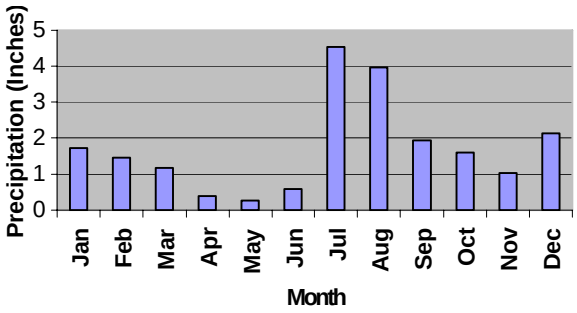
Elevations in the memorial range from 4,750 feet in the southeastern corner to 7,825 feet along the northwest boundary. Steep terrain predominates in the northern and western parts of the memorial, particularly in Montezuma Canyon, although the eastern scarp rises most steeply at higher elevations. The southeastern quarter of the memorial is a broad grassland plain dissected by numerous drainages. The eastern and southern parts of the Huachuca Mountains, including Montezuma Canyon, drain into the San Pedro River.

CLIMATE

The average yearly precipitation at the national memorial ranges from 10 to 33 inches, with an average of 21 inches. About 40% of the precipitation in this area falls as afternoon thundershowers in July and August, and about 25% falls as rain and snow in December through February. Normal summer temperatures range from 50°F to 90°F; winter,

from 30°F to 60°F. Figure 1 displays a 40-year average (1961–2000) of precipitation data collected at the memorial.

FIGURE 1: PRECIPITATION DATA, 1961–2000, CORONADO NATIONAL MEMORIAL



CAVE RESOURCES AND ABANDONED MINES

Mines

Caves and abandoned mines in the memorial are important, because of the fauna that use them, as well as because of their historic use by humans. A number of abandoned mines in the memorial are remnants of previous copper mining. The National Park Service installed bat-friendly gates at the entrances of two mines to protect human health and safety, as well as protecting the fauna that inhabit the mines. These gates are effective in restricting visitors from entering the mines while still allowing bats and other wildlife species to enter them. Some mines are described under "Cultural Resources" (see p. 102) because they have historic qualities. The mines themselves would not be affected by activities associated with any alternative. The effects on wildlife that each alternative would cause are described in the sections headed "Threatened, Endangered, or Sensitive Species" and "Wildlife" in the "Environmental Consequences" chapter.

Coronado Cave

Several caves in the memorial have geological value, the most prominent being Coronado Cave, which is 0.75 mile from the visitor center, up a steep trail. Before hiking to the cave, visitors must obtain a free permit. Coronado Cave is about 600 feet long, 20 feet high, and 70 feet wide. There are several crawlways and passages, but they are not extensive. Fewer than 5,000 people visit Coronado Cave each year, which is about 5% to 6% of the total yearly visitors.

The limestone in which Coronado Cave formed is 250–300 million years old. Water has seeped through cracks in the limestone, slowly dissolving the rock. In the cave can be seen tilted bedding planes of limestone, which illustrate the region's geologic history (NPS 2000a). The cave contains a beautiful range of formations: stalactites (hanging from the ceiling), stalagmites (rising from the ground), flowstone (calcite that appears to be smooth and flowing) and helicites (tiny crystalline shrubs). These formations are still growing.

Coronado Cave is home to a diverse community of insects: beetles, millipedes, spiders, and crickets. Some insect species are adapted to the darkness and low-energy environment of the inner cave. Mammals that use the cave include coatimundis, ringtails and bats. These animals usually do not venture far into the cave but stay near the entrance where there is adequate light. Several bat species have been observed in the cave. Bats depend on the dark, quiet cave environment for sleeping and hibernation (NPS 2000a).

AIR QUALITY

Coronado National Memorial is a class II air-shed. Under the Environmental Protection Agency (EPA) class II designation, there is no monitoring for visibility, and some degradation in air quality is allowed. The nearest air quality monitoring station is in the town of Douglas, also in Cochise County. This station monitors ambient air for carbon monoxide (CO), ozone (O_3), lead (Pb), and two sizes of particulate matter, 2.5 microns (PM2.5) and 10 microns (PM10). There have been no

reports that any measured parameters have exceeded air quality standards at the monitoring station (AZ Dept. of Env. Qual. 2000a).

Coronado National Memorial is in a rural area; so it is not affected by emission from urban traffic or industry. Occasional haze and decreased visibility in the memorial are largely due to dust and dirt from local sources (agricultural fields, dirt roads, or construction sites) being picked up by the prevailing winds. Tucson, about 75 miles to the northwest, is a nonattainment area for air quality, and pollution generated there is carried to the skies above the memorial.

Although the National Park Service has little direct control over air quality in the region, the memorial cooperate with the Arizona Department of Environmental Quality and the Environmental Protection Agency to monitor air quality and protect it from degradation. In addition, the National Park Service will take the following actions to meet legal and policy requirements related to air quality:

- participate in regional air pollution control plans and review permit applications for major new air pollution sources
- conduct memorial operations in compliance with federal, state, and local air quality regulations

Effects on air quality can be short-term or long-term. Short-term impacts usually are associated with vehicle traffic or construction activities and often consist of fumes and fugitive dust generated by construction equipment. Long-term emissions are those caused by stationary, consistent polluters such as power plants and industry.

SOILS

Soils in Coronado National Memorial are variable, with soil depths ranging from less than 20 inches on the steeper slopes to more than 60 inches on the lower slopes. They typically are high in rock fragments. Sandy loams and gravelly sandy loams are the most frequently encountered surface and subsurface textures. Other textures present include coarse sandy loam, clay loam, and gravelly clay.

Table 10 lists the soils in the memorial and contains a description of the associated slope, elevation, and ecological site. Only soil types with potential to be affected by alternative actions are included. The table also indicates the soils present on each grazing allotment. The list is based on a survey of the area conducted in 1996 (NRCS, USDA 2000).

The erosion potential associated with each soil complex is shown in table 10. The erosion factor (K) indicates the susceptibility of a soil to sheet and rill erosion by water. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by rain. Wind erodibility indicates the susceptibility of soil to wind erosion. The classification of erodibility groups in the memorial ranges from 2 (highly erodible) to 8 (less subject to wind erosion). Erosion potentials for many soils in the memorial fall in the high range and should be of concern with regard to grazing. High erosion potential is compounded by soils that have rapid runoff potentials and low water-holding capacity. Figure 2 depicts the distribution of memorial soils. More detailed descriptions of soils are available in USDA 1979 and NRCS, USDA 2000.

VEGETATION AND RANGE CONDITION

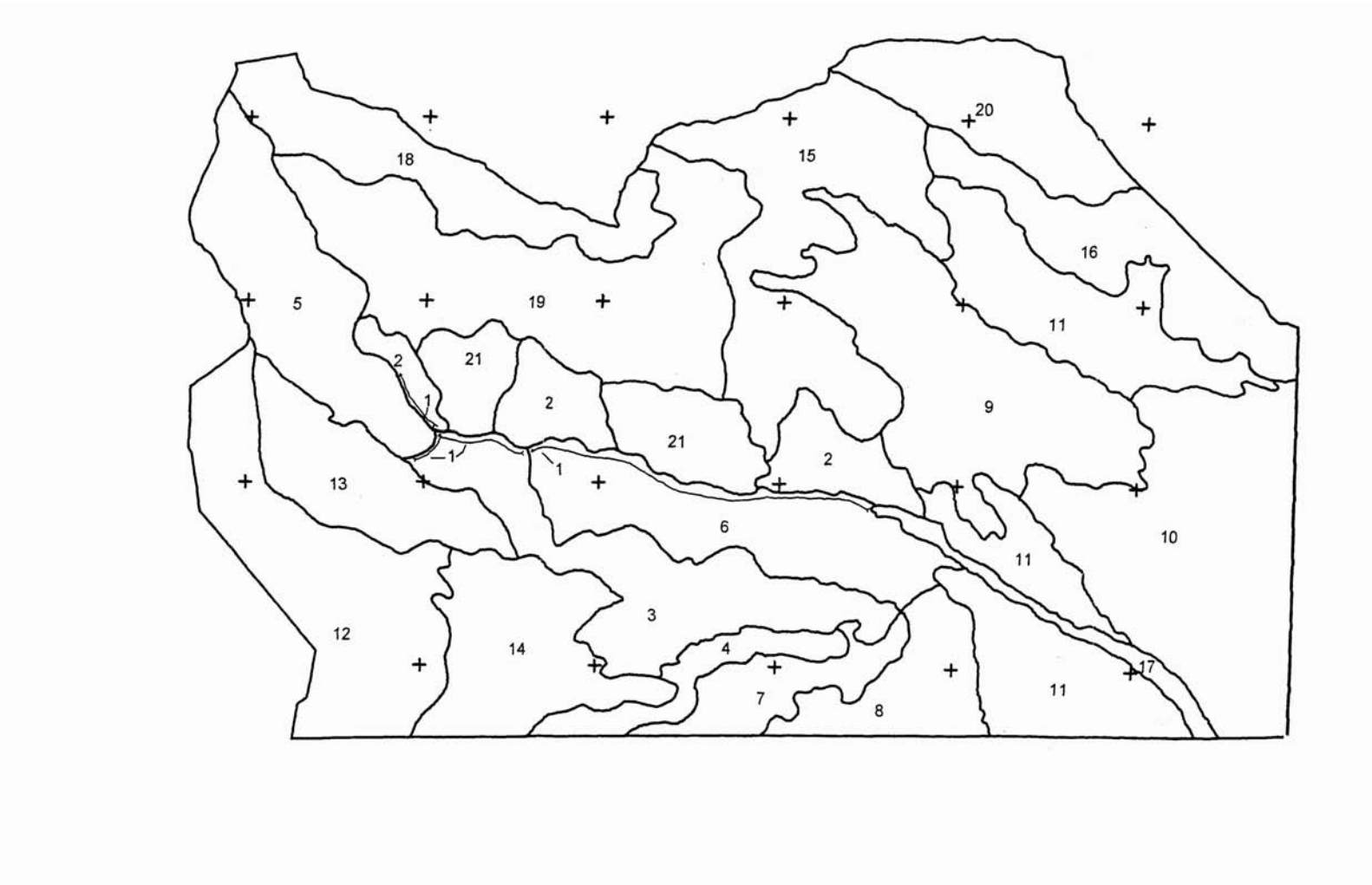
The vegetation in Coronado National Memorial was surveyed and mapped in 1991. It was classified into biotic communities, and a determination of acreage was made for each biotic community (Ruffner and Johnson 1991). In addition, Parfitt and Christy (1992) provided a detailed listing of more than 580 plant species collected at the memorial and housed at Arizona State University.

TABLE 10: SOILS CHARACTERISTICS, CORONADO NATIONAL MEMORIAL, COCHISE COUNTY, ARIZONA

Map Unit	Soils	Slope Range (%)	Ecological Site/Precipitation Zone	Elevation (feet)	Presence on Grazing Allotment	Erosion Factor K	Wind Erodibility Group
1	Aridic Ustifluvents - Riverwash complex	4–7	Sandy Bottom (QUHY, QUAR)/ 20–23 inches	5,200–5,800		0.02–0.05	2–6
2	Budlamp - Kinockity - Rock outcrop complex	8–20	Shallow Hills/ 16–20 inches	5,100–6,000	MZ[a/]	0.02–0.05	8
3	Canquya - Rock outcrop complex	50–75	Shallow Hills (QUEM, QUAR, JUDE)/ 20–23 inches	5,600–6,600	JS, MZ	0.05–0.49	6–8
4	Canquya - Rock outcrop complex, warm	50–75	Shallow Hills (QUEM, QUAR, JUDE)/ 20–23 inches	5,600–6,600	JS	0.05–0.49	6–8
5	Canquya - Tomarizo - Yarbam complex	35–65	Shallow Hills (QUEM, QUAR, JUDE)/ 20–23 inches; Limestone Hills/ 16–20 inches	5,600–6,800		0.05–0.10	5–6
6	Canquya - Zaleska - Morimount complex	25–50	Shallow Hills (QUEM, QUAR, JUDE)/ 20–23 inches	5,200–5,900	MZ	0.02–0.17	6
7	Coppercan - Canquya complex	30–60	Shallow Hills 16–20 inches	5,200–6,000	MZ	0.05–0.49	6
8	Coppercan - Yarbam - Rock outcrop complex	6–20	Shallow Upland/ 16–20 inches/ Limy Upland/ 16–20 inches	4,950–5,400	MZ	0.05–0.15	6–8
9	Gardencan complex	6–10	Sandyloam Upland (QUAR, QUEM, QUOB)/ 16–20 inches	5,100–5,600	JS, MZ	0.05–0.32	3–5
10	Gardencan - Larque complex	0–5	Shallow Hills/ 16–20 inches	4,825–5,100	JS, MZ	0.05–0.28	3
11	Gardencan - Terrarossa complex	2–18	Sandyloam Upland/ 16–20 inches/ Loamy Upland/ 16–20 inches	4,800–5,400	JS, MZ	0.05–0.32	5–6
12	Guaynaka - Costavar - Rock outcrop complex	30–60	Shallow Hills/ 16–20 inches	5,500–5,864		0.05	6–7
13	Guaynaka - Costavar - Rock outcrop complex	65–75	Shallow Hills (QUEM, QUAR, JUDE)/ 20–23 inches	5,800–6,864		0.05	6–7
14	Guaynaka - Rock outcrop complex	45–60	Shallow Hills/ 16–20 inches	5,350–6,500		0.05	6–8
15	Kinockity - Budlamp - Rock outcrop complex	45–75	Shallow Hills/ 16–20 inches	5,300–6,900	JS	0.02–0.05	8
16	Lutzcan - Yarbam complex	25–50	Shallow Hills/ 16–20 inches/ Limestone Hills/ 16–20 inches	5,000–6,000	JS	0.05–0.10	6
17	Montcan - Amuzet - Riverwash complex	3–5	Sandy Bottom/ 16–20 inches	4,850–5,200	JS, MZ	0.02–0.15	2–5
18	Morgamine - Yaquican complex	3–5				0.02–0.10	6
19	Rock outcrop - Kinockity complex	50–75	Shallow Hills/ 16–20 inches	5,800–7,000	JS	0.02–0.05	8
20	Yabamar - Bothompeek - Rock outcrop complex	60–80	Shallow Hills/ 16–20 inches	5,600–7,300	JS	0.02–0.1	8
21	Yarbam - Rock outcrop - Morimount complex	30–60	Limestone Hills/ 16–20 inches	5,300–6,000		0.02–0.10	6–8

a/ JS = Joe's Spring allotment. MZ = Montezuma allotment.

FIGURE 2: CORONADO NATIONAL MEMORIAL SOIL MAP
(DATA FROM NATURAL RESOURCES CONSERVATION SERVICE, USDA, BY DENNY AND PEACOCK 2000,)

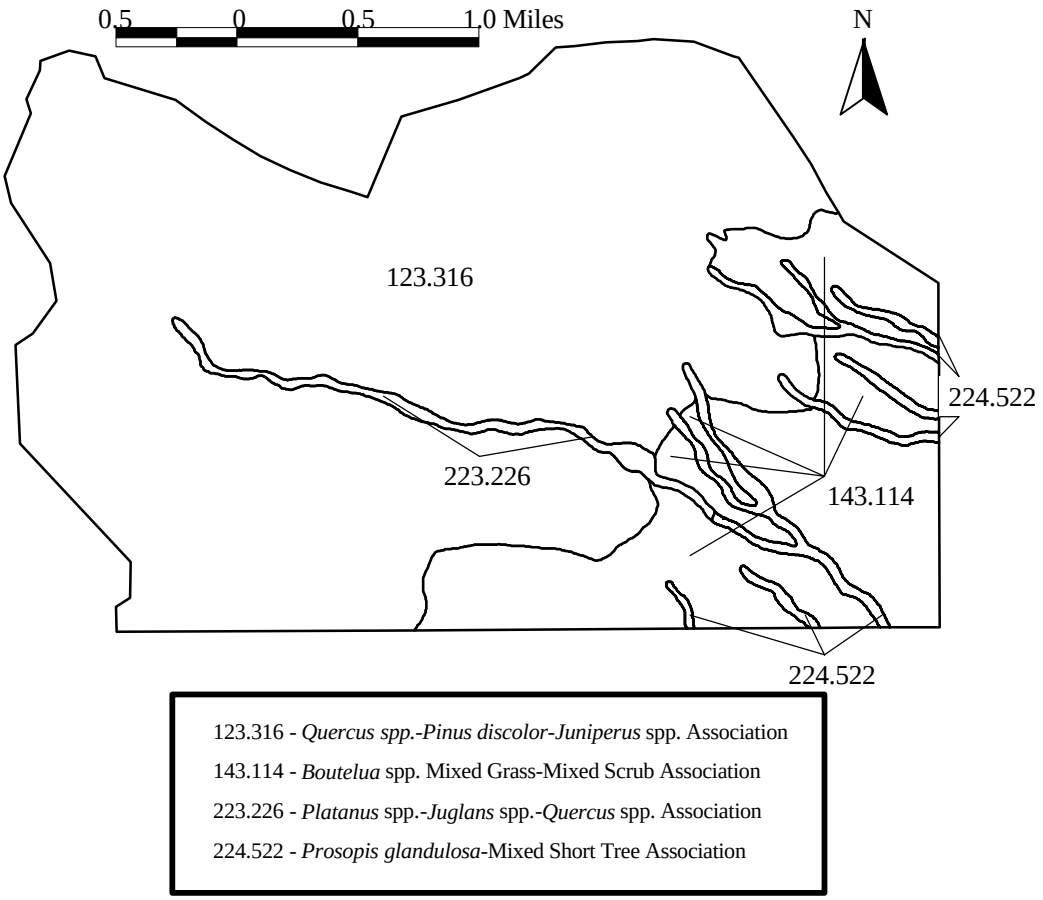


(See next page for legend.)

Legend for Figure 2.

Soil Characteristics	
1	Aridic Ustifluvents - Riverwash complex, 4 to 7 percent slopes
2	Budlamp - Kinockity - Rock Outcrop complex, 8 to 20 percent slopes
3	Canquya - Rock outcrop complex, 50 to 75 percent slopes
4	Canquya - Rock outcrop complex, warm, 50 to 75 percent slopes
5	Canquya - Tomarizo - Yarbam complex, 35 to 65 percent slopes
6	Canquya - Zaleska - Morimount complex, 25 to 50 percent slopes
7	Coppercan - Canquya complex, 30 to 60 percent slopes
8	Coppercan - Yarbam - Rock outcrop complex, 6 to 20 percent slopes
9	Gardencan complex, 6 to 10 percent slopes
10	Gardencan - Larque complex, 0 to 5 percent slopes
11	Gardencan - Terrarossa complex, 2 to 18 percent slopes
12	Guaynaka - Costavar - Rock outcrop complex, 30 to 60 percent slopes
13	Guaynaka - Costavar - Rock outcrop complex, 65 to 75 percent slopes
14	Guaynaka - Rock outcrop complex, 45 to 60 percent slopes
15	Kinockity - Budlamp - Rock outcrop complex, 40 to 75 percent slopes
16	Lutzcan - Yarbam complex, 25 to 50 percent slopes
17	Montcan - Amuzet - Riverwash complex, 3 to 5 percent slopes
18	Morgamine - Yaquican complex, 55 to 70 percent slopes
19	Rock outcrop - Kinockity complex, 55 to 70 percent slopes
20	Yabamar - Bothompeek - Rock outcrop complex, 60 to 80 percent slopes
21	Yarbam - Rock outcrop - Morimount complex, 30 to 60 percent slopes

FIGURE 3: VEGETATION ASSOCIATIONS AT CORONADO NATIONAL MEMORIAL AS MAPPED BY RUFFNER AND JOHNSON 1991)



Four plant associations have been identified in the area: oak-Mexican piñon-juniper association (QPJ), grama species mixed grass-mixed scrub association (BMM), sycamore-walnut-oak association (PJQ), and honey mesquite-mixed short tree association (PMT). QPJ is the most common plant association in the memorial, covering 3,400 of 4,750 acres. Next most common, but far less prevalent is BMM, which covers 1,063 acres. See figure 3, from Ruffner and Johnson 1991).

The QPJ association is an open, evergreen woodland community. Grasses typically comprise most of the understory. In the memorial, this association occurs mostly on north- and south-facing slopes of the Huachuca Mountains. Dominant species vary with site, slope, and exposure.

Typical plant species are alligator juniper, Arizona white oak, Emory oak, manzanita, Mexican blue oak, mountain mahogany, beargrass, desert spoon, and side oats grama. Appendix E contains a list of the scientific names for these and the other plant species.

The BMM association is largely a Chihuahuan semidesert grassland community dominated by perennial grasses and shrubs. Characteristic plant species are fairy duster, rabbit brush, hedgehog cactus, Palmer agave, Lehmann lovegrass, and blue grama. Lehmann lovegrass, a species introduced from South Africa, appears to be spreading throughout much of southern Arizona to the detriment of native grasses that are more palatable to grazing animals (Brown 1982).

The PJQ association is a mixed-broadleaf forest community that often forms a well-developed gallery but has sparse understory flora. This association occurs along major and secondary drainages where water is perennial or seasonally intermittent, such as in middle and upper Montezuma Canyon. Consequently, this association comprises only about 100 acres in the memorial. Plant species typical of this association are Arizona white oak, Arizona rosewood, Arizona sycamore, catclaw acacia, manzanita, brickellia, wild grape, and needle grass.

The PMT association is a type of Sonoran Desert riparian forest that typically occurs below 3,900 feet and is restricted to areas around streams, springs, ephemeral drainages, and areas that have a shallow water table. Trees usually do not form a closed canopy in this association. The association, which is a minor biotic community in the memorial (covering about 224 acres) is found in the eastern third of the memorial along drainages of lower Montezuma Canyon. Typical species in this association are Arizona white oak, desert willow, Emory oak, honey mesquite, poison ivy, rabbit brush, sumac, cane cholla, Lehmann lovegrass, and side oats grama.

The Joe's Spring and Montezuma grazing allotments cover 39% of Coronado National Memorial. The current range condition in the grazing allotments varies between and within allotments. The Joe's Spring allotment generally has more mature series than the Montezuma allotment, probably because the steep slopes in the Joe's Spring allotment limit livestock grazing in many areas.

The most common vegetation associations in the grazing allotments are the oak-Mexican piñon-juniper and grama species mixed grass-mixed shrub associations, which constitute 93 percent of the memorial's total vegetation (NPS 2000b). Brady et al. (1989) have documented significantly greater native plant species richness in ungrazed areas compared to those that are grazed.

The potential natural community is the biotic community that would become established if all successional sequences were completed without interference by humans under the present environmental conditions (Soc. for Range Mgmt. 1989). In addition to potential natural community, standard condition classes are early, mid, and late seral. Range condition is computed as a number between 0 and 100, representing the percentage of potential vegetation. Ratings of 0 to 25 are considered early seral, 26 to 50 are mid seral, and 51 to 75 are late seral. Scores above 75 are classified as potential natural community. Utilization is defined by the Society for Range Management (1989) as the "proportion of current year's forage production that is consumed or destroyed by grazing animals."

Livestock seeking water, succulent forage, and shade can spend a disproportionate amount of time in riparian communities. Data collected in the Joe's Spring allotment in 1989 indicated that the southern part of the allotment had utilization levels of more than 30%, with a more than 45% use of an area near water. Cattle congregating to graze and water at ephemeral streambeds trample vegetation and compact soils, leading to streambank sloughing, soil erosion, and poorer water quality (Armour, Duff, and Elmore 1991). The presence of cattle in riparian areas leads to trampling and overgrazing of streambanks, soil erosion, loss of streambank stability, declining water quality, and drier conditions. Unstable streambanks lead to increased sediment load in the water and inferior water quality during periods of runoff. These changes can lead to reduced habitat for riparian plant species and wildlife, thereby causing many native species to decline in number and density (Belsky, Matzke, and Uselman 1999).

In the most recent inventory (Ogden 1995), about 54% of the Joe's Spring allotment was rated as potential natural community. About 34% was rated as mid seral, and 12% was not rated. However, because the range inventory did not consider all factors of range health, the

condition may have been overestimated. For example, neither erosion nor the age distribution of plants was considered.

A positive correlation between slope and range condition was noted in the Joe's Spring allotment, indicating that areas on lower slopes are more heavily grazed than steeper areas. This matched observations that livestock use is concentrated on the lower slopes in the southern third of the allotment. In 1995 and 1996, inspection of the allotment showed utilization to be in excess of 50% throughout much of the lower portion of the pasture (L. Benson, personal observation).

U.S. Forest Service monitoring data from the Montezuma allotment in 1985 showed that a third of the allotment had a utilization rate greater than 45%. Another third was between 25% and 45% utilization, and the remainder had a utilization rate under 25%.

There have been no livestock in the Montezuma allotment since 1990. In the most recent inventory of that allotment (Ogden 1995), 23% of the area was early seral, 17% was mid seral, 43% was late seral, and 16% was potential natural community. Much of the eastern part of the allotment is dominated by Lehmann lovegrass, a nonnative introduced grass primarily rated as early seral. Areas with limited access because of slope had more mature series than did grazed areas. The presence of mid to late seral stages in 60% of the area indicated that plant recovery was in progress several years after livestock removal.

Under the *Livestock Management Plan* (NPS 2000b), grazing management has intensified. The goal is to improve the condition of the range in the future. Implementation of the plan has involved the following:

- Reducing the animal unit months to reduce the effect of grazing on native vegetation.
- Adjusting the season of use to avoid grazing during vegetative growing seasons.
- Implementing a comprehensive vegetation monitoring plan.
- Providing flexibility of use in both number of animal unit months and season of use, based on environmental indicators.

An important plant species in Coronado National Memorial is the Palmer's agave (*Agave palmeri*). It is the only agave in the national memorial that occurs in sufficient numbers to study. All of the information presented here is from *The Status of Palmer's Agave at Coronado National Memorial* (Hawks 1997). The nectar of flowering Palmer's agave is an important food source for the lesser long-nosed bat and the Mexican long-tongued bat, both of which are discussed in the next section entitled "Threatened, Endangered, or Sensitive Species." Hummingbirds also drink the nectar produced by the flowers.

Herbivores such as cattle, white-tailed deer, and small rodents eat the newly emerged flowering stalks of the plant. Hawks (1997) postulates that deer and other wildlife may depend on the water and energy obtained by eating the flowering stalks, and that the energy in the flowering stalks may be especially important for pregnant deer.

Hawks (1997) cites studies by Martinez-Morales and Meyer (1985) and by Hodgson and DeLamater (1988) that found grazing was detrimental to other species of agave, including Arizona agave (*Agave arizonica*) and marguay verde (*Agave salmiana* spp. *crassispina*). She reports that these studies attributed adverse effects to the grazing of flowering stalks, trampling of young individual plants, and soil compaction.

To determine the effects of cattle grazing on Palmer's agave in Coronado National Memorial, Hawks (1997) established four test plots in areas that currently are grazed, and five test plots in areas in the park that had not been grazed for at least seven years. She also established two test plots in similar settings at

nearby Fort Huachuca that had not been grazed for more than 45 years. In presenting her conclusions, Hawks cautioned that only two years of data were available and that additional study should be conducted. She then stated: Another objective of this study was to determine the extent of herbivore predation in Palmer's agave. Palmer's agave flowering stalks proved to be fairly important to the herbivores present in the plant's range. High predation occurred in all the plots, grazed and nongrazed. The final objective was to determine if grazing was negatively affecting Palmer's agave. There is no evidence that grazing is impacting the population, and no significance between recruitment in the two treatments was found. It was also determined that other herbivores, such as deer, can cause as much stalk predation as cattle.

THREATENED, ENDANGERED, OR SENSITIVE SPECIES

Several species identified as sensitive at the federal or state level are known to exist in Coronado National Memorial or may exist in the memorial. The large number of sensitive species in the region is attributable to the diversity of habitats present.

The U.S. Fish and Wildlife Service provided a list of threatened, endangered, proposed, and candidate species for Cochise County in March 2000 (see appendix F). As is discussed below, many of these species do not inhabit the memorial because it does not provide suitable habitat. Other species historically have been observed in the memorial but have been extirpated or have not been recorded in the area for many years. Table 11 lists the four species on the USFWS list that probably exist in the memorial (and potentially could be affected by the alternative actions).

Arizona lists two species as species of concern that are known to exist in the memorial — the barking frog and the elegant trogon. These species were not included in this evaluation because none of the action alternatives would affect them or their habitats.

Threatened, endangered, proposed, or candidate fauna known to have existed historically in Coronado National Memorial are Mexican wolf, ocelot, bald eagle, Sonora Tiger salamander, Arizona shrew, black-tailed prairie dog, and jaguar. Although Coronado National Memorial has potential habitat for these species, they are not known to exist in the memorial at this time.

Jaguarundi have been reported in or near the Huachuca Mountains but never have been confirmed in Arizona. Potential habitat may exist in the memorial, but this area may be outside the range of the species. The Yaqui

TABLE 11: SPECIAL STATUS SPECIES THAT MAY EXIST IN CORONADO NATIONAL MEMORIAL

Federal Status: Endangered = species in imminent jeopardy of extinction; Threatened = species in imminent jeopardy of becoming endangered; Species of Concern = a species that may or may not be listed in the future.
State Status: WC = Wildlife species of concern in Arizona: species whose occurrence in Arizona is or may be in jeopardy, or with known or perceived threats or population declines.

Common Name	Scientific Name	Federal Status	State Status
Lesser long-nosed bat	*Leptonycteris curasoae*	Endangered	WC
Mexican long-tongued bat	*Choeronycteris mexicana*	Species of concern	WC
Loggerhead shrike	*Lanius ludovicianus*	Species of concern	No status
Mexican spotted owl	*Strix occidentalis lucida*	Threatened	WC

topminnow, cactus ferruginous pygmy-owl, and whooping crane are known to exist or have existed in Cochise County. However, the memorial has little or no potential habitat for these species, and they are not known to inhabit the memorial.

The U.S. Fish and Wildlife Service lists three plant species as existing in Cochise County: Canelo Hills ladies' tresses (endangered), Cochise pincushion cactus (threatened), and Huachuca water umbrel (endangered). None of these is known to be in the memorial; therefore, they were dismissed from further consideration.

Lesser Long-Nosed Bat

The lesser long-nosed bat was on the federal list as endangered on September 22, 1988. It also is classified as a state wildlife species of special concern. The bat was in jeopardy because of disturbance to roost sites and direct killing by humans. In addition, the bats are threatened by a loss of food sources (paniculate agave) because of activities such as agave harvesting by the liquor industry in Mexico. Studies on the lesser long-nosed bat have been conducted by Cockrum and Hayward (1962), Howell (1974, 1976, 1980), Howell and Roth (1981), and Fleming, Nunez, and Sternberg (1993).

This bat's size is medium to large, and it has an elongated muzzle, a small leaf shaped nose, and a long tongue. It is yellowish brown or gray above and cinnamon brown below. Its tail is minute and appears to be lacking. This species usually can be found in Arizona from April to September and in Mexico the rest of the year.

The lesser long-nosed bat feeds on agave and columnar cacti. In the daytime it roosts in caves and abandoned tunnels, where it is easily disturbed. By night it forages on nectar and pollen from saguaros, organ pipe cactus, and agaves. Lesser long-nosed bat roosts have been found in southern Arizona, southwest New Mexico and throughout Mexico. Surveys conducted between 1992 and 1993 indicate that the greatest densities of lesser long-nosed bats, based on the sizes of roosts, were found in northern Mexico and southern Arizona. The estimated sizes of roosts in Arizona and Mexico during this period ranged from 20 to 150,000 bats (USFWS 1995c).

During the reproductive season of April through June, lesser long-nosed bats are found at lower elevations in southwestern Arizona, where they establish maternity roosts. At higher elevation sites such as Coronado National Memorial, there are no sizable aggregations of lesser long-nosed bats until the latter part of July. The number of bats peaks in mid to late August, and most are gone by mid-September. This residency period of 6 and 8 weeks corresponds well with the blooming of Palmer's agave, which the bats use for food (Petryszyn and Alberti n.d.).

Before it was designated a national memorial, the Coronado area was extensively mined. This activity produced numerous adits, shafts, and prospects. Most of these are potential roost sites for bats, as are caves. In 1993 a major roost with more than 18,000 bats was discovered in the memorial. The bats occupy the site from the latter part of July to September or October (Petryszyn and Alberti n.d.). The population has averaged about 16,000 bats, fluctuating from a high of 31,000 in 1999 to a low of 9,000 in 1995.

Bat management in the memorial includes the placement of bat-friendly gates over the mouths of abandoned mine tunnels that are used as bat roosts. The gates prevent visitors from entering the tunnels while providing access for the bats.

Agave stalks are rich in carbohydrates, and as they begin to bolt, they are particularly palatable to domestic livestock and wild herbivores, including deer, javelina, rodents, and rabbits (Howell 1996).

Concern has been expressed about the impacts of grazing on agaves, the bats' primary

food source. Some studies found grazing to be detrimental to populations of agaves such as marguay verde because cattle consume the agaves' flowering stalks and trample young plants (Martinez-Morales and Meyer 1985). However, Hawkes (1997) found in Coronado National Memorial that other herbivores, such as deer, can cause as much stalk predation as cattle, and that there was no evidence that grazing is impacting the agave population. The U.S. Fish and Wildlife Service concurred that the new allotment management plans for Joe's Spring and Montezuma allotments would not be likely to adversely affect the lesser long-nosed bat. Both allotment management plans include an agave monitoring program to ensure that grazing does not reduce the agave population.

Mexican Long-Tongued Bat

The U.S. Fish and Wildlife Service lists the Mexican long-tongued bat as a species of concern, and the state of Arizona lists it as threatened (from the Internet at < www.mesc.nbs. gov/research/5003230.asp>). It appears to be threatened by the loss of food supplies and killing by humans.

The Mexican long-tongued bat is found from Central America to the southwestern United States, typically living in deep mountain canyons with dense riparian vegetation. In Arizona it is found from the lower edge of the oak zone to the fir belt. During the day, this species roosts in caves, rock fissures, old mines, and occasionally in buildings, usually in groups of fewer than 12 individuals. In Coronado National Memorial, this species has been captured in nets at water tanks. It also has been observed at several mine adits in the area and at hummingbird feeders. Mexican long-tongued bats are never found in great number, and they may move around from roost to roost on a nightly or weekly basis. They typically arrive in late spring and remain into autumn (Petryszyn and Alberti n.d.).

Mexican Spotted Owl

All of Coronado National Memorial is within the critical habitat for the Mexican spotted owl. A pair of these owls was first found in the memorial in 1997, and there were numerous sightings in 1998 in a small canyon west of the nest site. The pair bred and successfully fledged young in 1997 and 1999, using the same nest site both times. The memorial is in the process of establishing a protected activity center for this pair that will be based on topography and vegetation in the area surrounding the nest site.

The Mexican spotted owl is on the federal list of threatened species. It also is a species of special concern in Arizona. This species is threatened by habitat loss caused by logging and fires, increased predation associated with habitat fragmentation, and a lack of adequate protective regulations.

The Mexican spotted owl closely resembles the larger barred owl, but the plumage is more brown, with numerous white spots above and below. The posterior underparts have short, horizontal bars or spots rather than long, vertical streaks. These are the largest brown-eyed, tuftless-eared owls in their range. Their length usually is about 17.5 inches, and their wingspan is about 3.5 feet.

Mexican spotted owl nesting and roosting sites generally consist of multilayered, uneven-aged forests with high canopy closure or rocky shaded canyons (USFWS 1995b). Information is limited on the habitat use by foraging owls in southeastern Arizona. However, in northern Arizona, Mexican spotted owls forage primarily in mixed conifer forest on rocky slopes and pine-oak-juniper forests (Ganey and Balda 1994).

The Mexican spotted owl's geographic range covers portions of southwestern United States and extends into Mexico. Within this area, the Mexican spotted owl recovery team delineated six recovery units in the United States and five in Mexico. The Huachuca

Mountains are included in the Basin and Range–West Recovery Unit, which is characterized by mountain ranges isolated by desert basins. This recovery unit is believed to be important habitat because of the high number of spotted owls relative to other recovery units (USFWS 1995b).

A survey of mammals in the memorial conducted in 1996–1997 (Swann et al. 2000) mapped the presence of nocturnal rodents, including wood rats (*N. albigula*) and peromyscid mice, the Mexican spotted owls' most likely prey base in this area. Prey species of the Mexican spotted owl do not inhabit the grasslands of the Montezuma allotment, (about 93% of the allotment's vegetation). Prey species are common in the grasslands of the Joe's Spring allotment (68% of the allotment's vegetation) but uncommon in the oak woodlands (29%). They are extremely common in the riparian areas of both allotments (7% of Montezuma allotment vegetation; 3% of Joe's Spring allotment vegetation).

Within 0.5 mile of the protected activity center, prey species are extremely common in the mosaic of oak woodlands, oak savannas with abundant grasses, and oak riparian communities in the drainages. Specifically, prey species are 4–20 times more common there than they are in the grasslands and woodlands (which make up 95% of the combined allotment vegetated area). Prey biomass is also higher near the protected activity center because wood rats are more abundant in the upper-elevation oak savannas.

Loggerhead Shrike

Loggerhead shrikes, commonly known as butcher birds for their habit of impaling their prey on thorns, are a federally listed species of concern that has been sighted in the memorial. Shrikes are songbirds with hawk-like behavior and hook-tipped bills. They feed on insects, lizards, mice, or small birds (Peterson 1961).

Loggerhead shrikes are found from southern Canada to southern Mexico in open country. Common habitat features include lookout posts, wires, scattered trees, low scrub, or deserts. The shrikes nest in bushes or trees and breed from southern British Columbia south through the western United States. They winter mainly in the southwestern states. Loggerhead shrikes are rare in Coronado National Memorial, with sightings occurring in spring, summer and winter (SW Parks and Monuments Assn. 1993).

The populations of loggerhead shrikes have declined drastically. The population decline is thought to be due to the following causes:

- The use of pesticides, which has reduced the supply of insects, the shrikes' main food. Pesticides also may have adversely affected the birds' reproductive physiology (from the Internet: www.dnr.state.wi.us/org/land/er/factsheets/birds/shrike.htm).
- The loss of habitat, including wintering habitat, due to land development in coastal regions (from the Internet: www.wbu.com/chipperwoods/photos/logshrike.htm).

WATER RESOURCES AND WATER QUALITY

Coronado National Memorial is in the Sierra Vista subwatershed of the Upper San Pedro Basin in southeastern Arizona. The watershed encompasses about 950 square miles, extending from the international boundary with Mexico to about 27 miles north of Fairbank, Arizona (USGS 1999). The subwatershed is drained by the San Pedro River, which drains about 4,600 square miles. This river extends almost 200 miles from its headwaters in Sonora, Mexico, to its confluence with the Gila River near Winkleman, Arizona.

Historically, the water quality in the Upper San Pedro River basin has been compromised when storms have released pollutants from tailings or holding ponds and when sewage or mining wastes have been released. These have severely impacted surface waters in the San Pedro River. Regional surface water issues involve water quality in the San Pedro River and its tributaries.

Most surface waters in the memorial are ephemeral streams, consisting of dry washes, arroyos, or continuous and discontinuous gullies. Most of these surface water features drain toward the southeast. Ephemeral streams are dry most of the time, with flow generally occurring only for a short time after extreme storms. Some streams in the area probably were perennial before Tombstone (northeast of the memorial) began to divert streamflow for municipal use (AZ G&F Dept. 1954, cited in Ruffner and Johnson 1991).

Montezuma Canyon is the major drainage in the memorial. It receives flow from several ephemeral streams before its confluence with the San Pedro River. Evidence of streambank erosion and downcutting in Montezuma Canyon can be seen in areas where development and grazing have occurred. In addition, large amounts of eroded soils that have been transported downstream can be seen along drainageways.

There are at least 21 wells in the memorial. The well that provides water for NPS staff and visitors appears to have no additional capacity. If visitation or NPS staff increased, a study might be necessary to determine how to get more water or conserve enough to meet additional needs. The following other water resources are in the national memorial:

- a few seeps and springs — during wet years, Yaqui Springs and other springs will trickle much of the year.
- three stock tanks that have been developed for livestock use
- a water storage tank just north of the visitor center and employee residences

WILDLIFE

Coronado National Memorial has a great diversity of wildlife species for its size — mammals, reptiles, birds, and amphibians. This probably is due to a number of factors, including the presence of thick grassland vegetation; the memorial's location in the Sky Island ecosystem; and its connection to other natural areas nearby, including Coronado National Forest, the San Pedro River, and undeveloped areas in Mexico (Swann et al. 2000).

Recent inventories of the vertebrate fauna have identified 33 reptile and 5 amphibian species, 11 bat and 43 terrestrial mammal species, and 190 species of birds in memorial (Cockrum et al. 1979; Swann et al. 2000; (Petryszyn and Alberti n.d.); Swann, Alberti, and Schwalbe 2001; plus unpublished memorial observation data). Some reptiles in the vicinity of the visitor center may be night snake, common king snake, mountain patchnose snake, Chihuahuan blackhead snake, and lyre snake.

In addition to bats, the mammal species confirmed in the memorial are 1 marsupial, 1 insectivore, 2 rabbits and jackrabbits, 23 rodents, 13 carnivores, and 3 hoofed animals (Swann, Alberti, and Schwalbe 2001). Eighteen more mammal species may inhabit the memorial but were not confirmed during the study, or they were in the memorial in the past but probably are not there now.

Common bird species in the national memorial are hummingbirds, warblers, wrens, and sparrows. Raptors, including red-tailed hawk, Cooper's hawk, and American kestrel, are present but are observed less frequently.

CULTURAL RESOURCES

The following paragraphs contain an overview of the history of the region and the memorial, recent research, descriptions of the types of resources at the site, and inventories of specific extant resources.

THE EXPEDITION

Coronado National Memorial is the largest of 28 national memorials in the national park system. National memorials that commemorate people or events often have no tangible physical objects for visitors to relate to; therefore, interpretive materials are particularly important at a national memorial.

Early in the 16th century, Spain established a rich colonial empire in the Americas. From Mexico to Peru, gold poured into the Spain's treasury, and new lands were open for settlement. The frontier lay a few hundred miles north of Mexico City — beyond was unknown land. Antonio de Mendoza, viceroy of New Spain (Mexico), wanting to explore the land to the north of Mexico, selected Francisco Vásquez de Coronado. On January 6, 1540, Mendoza commissioned Coronado as expedition commander and captain-general of all lands he might discover and claim for king and country.

The expedition left Compostela on Mexico's west coast on February 23, 1540, with 336 Spanish soldiers, four priests, hundreds of Mexican-Indian allies, and 1,500 stock animals. Supplies were sent north by ship under Captain Hernando de Alarcón. After reaching Culiacán, Coronado and 100 soldiers marched ahead of the slower main army. It is most likely that the expedition traveled up the San Pedro River Valley, crossing into what became the United States just east of the present Coronado National Memorial.

They arrived on July 7, 1540, at Háwikuh, the first of the fabled Cities of Cibola. Instead of a golden city, they found a rock-masonry pueblo crowded with American Indians. After unsuccessful negotiations, the Spanish attacked and forced the Indians to abandon their village. While at Háwikuh, Coronado sent his captains out to explore. Don Pedro de Tovar traveled to the Hopi Indian villages in northeastern Arizona, and Garcia López de Cárdenas reached the Grand Canyon of the Colorado. Hernando de Alvarado and 20 men journeyed east past Acoma and Tiguex pueblos to Cicuye (Pecos) pueblo on the upper Pecos River. The army spent the winter of 1540–41 at Tiguex, where the Indians, at first friendly, grew hostile because of Spanish violations of hospitality and friendship. Battles followed, and the Spaniards killed the inhabitants of one pueblo and forced the Indians to abandon several others.

On April 23, 1541, the expedition set out for Quivira following an Indian guide. After 40 days, Coronado sent most of the men back to Tiguex and continued on with 30 others. At Quivira in central Kansas, they were again disillusioned — the houses in the villages were made of grass; there were no civilizations rich with gold and silver, as the guide had led them to believe. Coronado then had his Indian guide killed and led his men back to Mexico City in the spring of 1542. Although discredited, Coronado resumed his position as governor of New Galicia. He and his captains were called to account for their actions, and it was four years before he cleared his name.

Ten years after his return home, Coronado died in relative obscurity at 42. His actions had brought back knowledge of the northern land and its people. This opened a way for explorers and missionaries to colonize the Southwest and to help develop the distinctive culture we know today.

ARCHEOLOGICAL RESOURCES AND HISTORIC STRUCTURES

Aboriginal populations have been present in the area surrounding Coronado National Memorial for the past 10,000 years. Paleo-Indian activities took place in the San Pedro Valley near the memorial. The Cochise Culture (8500 B.C.–300 B.C.) originally was defined in the Sulphur Springs Valley to the east of the San Pedro. Cochise Culture has been divided into three stages: Sulphur Springs (7500 B.C.–3500 B.C.), Chiricahua (3500 B.C.–1500 B.C.) and San Pedro (1,500 B.C.–300 B.C.). The Paleo-Indian adaptations to the land represented a hunting-gathering lifeway. However, some evidence for sedentary farm and semipermanent pit house villages can be found toward the end of the San Pedro stage. Farming methods later expanded to include canal irrigation and permanent settlements, first in pit houses and later in aboveground pueblo form. The San Pedro Valley immediately east of the memorial displays this cultural history in its entirety: Paleo-Indian adaptations, Cochise culture, and later agricultural adaptations.

The Upper Piman and Sobaipuri Indians, who followed an agricultural lifestyle in proto-historical times, used the San Pedro and Santa Cruz Valleys. Coronado made contact with these groups, as did later Spanish explorers and missionaries. By A.D. 1500, the Hohokam culture was predominant and the Spanish settlement of the area began. In the late 18th century, the Spanish government gave land grants to settlers in the area. Following the War with Mexico, Mexican jurisdiction of the area ended with the Gadsden Purchase in 1854. The completion of the Southern Pacific Railroad in the 1860s allowed the expansion of cattle markets and increased the agricultural and mining possibilities. During the late 1800s, military posts were established. This resulted in extensive cattle ranching, farming, and mining by 1885.

The Huachuca Mountains attracted the attention of prospectors and miners. In the immediate vicinity of the memorial are several claims from this period. Mining in Montezuma Canyon began in the 1880s and continued sporadically over the years, but the only operation of any real duration was the State of Texas mine in Montezuma Canyon near the present northern boundary of the memorial. The mine, which produced commercial grade lead-zinc ore, was mined intermittently between 1902 and World War II.

Ranchers first arrived in the area in the late 1890s. At that time, water was one of the prime factors inviting settlement. Montezuma Creek was flowing, although it ceased to be a permanent stream shortly after the turn of the century. William Ratliff began ranching in the area of the memorial. After Ratliff's death in 1917, Joe Pyeatt, an heir, began ranching in the area at the site of the Montezuma Ranch. The ranch went through a series of owners.

Another activity common in Montezuma Canyon was the illegal production of liquor during the Prohibition era. The canyon's isolation made it an ideal place for the location and operation of stills. In addition, mescal was smuggled across the border for sale at Fort Huachuca during that period. A trail used by smugglers cuts through the eastern part of the memorial.

Coronado National Forest was established in the early 1900s. The Civilian Conservation Corps (CCC) in the 1930s constructed a road in the area of the memorial that went over Montezuma Pass. Coronado National Memorial was authorized in 1941 and established in 1952 by presidential proclamation. It was created from U.S. Forest Service lands.

Archeological surveys of slightly more than one-third of the memorial have been completed. Areas not surveyed are places where the terrain is too steep to conduct a survey. These surveys found both prehistoric and historic sites. The prehistoric sites were Cochise Culture hunting and gathering sites,

and the historic sites are related to mining and ranching activities. A total of 15 sites are listed on the NPS Archeological Management Information System.

Seven structures are listed on the list of classified structures for the memorial: International Boundary Monuments 100, 101, and 102; the ruins of the Doreador and Clark-Smith mining sites; graves associated with the former Ratliff Ranch; and a road constructed by the Civilian Conservation Corps. The resources determined eligible for nomination to the National Register of Historic Places were International Boundary Monuments 100, 101, and 102 and the Montezuma Pass Road.

The Ash Mountain and Sunnyside CCC camps were constructed near the Montezuma Pass Road between 1933 and 1935. This was a rural development project for the purpose of shortening distances between ranches from 103 to 11 miles. The last 2-mile stretch of the road in the memorial remains unpaved and contains 76 culverts with stone masonry headwalls and spillways. In 1998, many of the culverts, headwalls, and spillways received preservation treatment.

ETHNOGRAPHIC RESOURCES

Information about ethnographic resources in the national memorial is limited. On occasion, members of the Apache tribe have gathered acorns on national memorial lands.

CULTURAL LANDSCAPES

Three Coronado National Memorial cultural landscapes are listed on the NPS cultural landscape inventory. A level II cultural landscape inventory will not be performed on any of these landscapes before 2002. A level I cultural landscape inventory has been completed for only one, Montezuma Ranch (in 1999). On the basis of that information, level II inventory is not planned for the ranch. The investigation concluded that ranch was of local significance, but there are severe integrity problems. The inventory concluded that the Montezuma Ranch is not eligible for listing on the National Register of Historic Places as a historic landscape. A level I cultural landscape inventory will be completed for abandoned mine sites (all sites would be considered one landscape) in 2002 if funding and staffing is available. The third landscape, the entire memorial viewshed, is scheduled for inventory after 2005. That inventory will look at previously unevaluated roads, trails, and structures to determine if any can be identified as being part of a cultural landscape.

VISITOR UNDERSTANDING AND RECREATIONAL RESOURCES

ACCESS AND VISITOR FACILITIES

No fee is required to enter Coronado National Memorial. Most visitors arrive by private vehicle through the east entrance from Arizona Highway 92. A small percentage of visitors, such as school groups or van tours, arrive by bus. Approximate driving times from nearby cities to the east entrance of the memorial are shown below.

Sierra Vista	0.50 hour
Bisbee	0.50 hour
Tucson	1.75 hours
Phoenix	3.75 hours

The nearest airport of any size is in Tucson, but flights are available to Sierra Vista. Travelers can reach the memorial from Tucson by taking Interstate Highway 10 southeast to exit 302, then taking Arizona Highway 90 south to Sierra Vista, and then AZ 92 south to Coronado Memorial Drive, which leads to the memorial entrance. An alternate route would be to go west from Bisbee on AZ 92 to Coronado Memorial Drive and follow it to the memorial entrance.

Many visitors are either year-round or seasonal residents of southern Arizona who make day trips from home. The memorial's increasing visitation reflects population growth in the region. Most visitors from outside the area come to the memorial as part of a larger regional travel itinerary.

The memorial's visitor facilities, described below, are the visitor center, a picnic area, the road from the entrance to Montezuma Pass, and a shelter and interpretive waysides at Montezuma Pass. Overnight use is not permitted at the memorial.

- The visitor center, near the center of the national memorial along the main road, offers orientation, information, an interpretive trail, and restrooms. The parking area holds about 20 cars.
- The picnic area is just south of the main road and across from the visitor center. Facilities include tables, water, and restrooms.
- The road climbs from the entrance to the top of Montezuma Pass. From the pass there is a panoramic view of the San Pedro River Valley, where Coronado may have entered what is now the United States.
- The scenic overlook at Montezuma Pass is 3 miles west of the visitor center. There are interpretive waysides along an interpretive trail 0.4 mile long leading from the pass to Coronado Peak. From Coronado Peak, visitors can view the San Pedro River Valley to the east and San Rafael Valley to the west.

Coronado Cave, 600 feet long, is accessible by a one-way trail 0.75 mile long that begins at the west end of the visitor center parking area. The trail, formed by water seeping through cracks in the limestone, contains numerous formations, some of which are still growing. The cave has numerous scalloped and tilted limestone bedding planes that illustrate the tectonic and hydrologic history of the region. A permit, free of charge, must be obtained at the visitor center before entering the cave.

VISITATION TRENDS

Recreational visits to Coronado National Memorial increased by 87% over the past 20 years, from 47,825 in 1981 to 89,523 in 2000. Visitation increased by 58% between 1990 and 1998, with 1996 the peak year. In the same period, the population in Cochise County grew 27%. The average yearly visitation over the past 10 years was about 85,890. The yearly average rises to 91,750 when the most recent five years are considered. Increased visitation

to the memorial in 1999 can be attributed to an article about Coronado Cave in the January 1999 issues of *Arizona Highways* magazine. Factors that decreased visits since 1981 were a fire in 1988 and U.S. government shutdowns in 1995 and 1996.

Visitation is highest in February, March, and April. Many school groups visit in May. The busiest week usually is the one between Christmas and New Year's Day. Between 1990 and 2000, the lowest visitation month was June three times, September and October twice, and January, February, August, and December, once each.

Figure 4 depicts the annual use of the national memorial based on traffic counts. Memorial visitation generally rose from 1981 to 1996, when visitation reached a high of about 96,000 visitors. After this period, visitation declined slightly, to about 90,000 visitors annually.

Most visitors go to the higher elevation sites in the memorial. The lower grasslands are little used for recreation; however, the use of these lower elevation areas is increasing because of visitor interest in exploring and hiking more of the memorial.

Visitation is expected to continue to increase throughout the 15- to 20-year implementation of this plan. The following factors are expected to contribute to increased visitation:

- increases in local population size
- increasing urbanization
- the development of other local tourist attractions, which will draw additional nonresident visitors into the area

The trend of increasing use and a growing proportion of visitors originating from outside the local area, if it continued without corresponding improvements in visitor services, might eventually affect the visitor experience at Coronado National Memorial.

Coronado Cave is one of the attractions of the memorial. About 5.5% of visitors to Coronado National Memorial include the cave in their visit. Visitation to the cave more than doubled between 1990 and 2000, with about 5,000 visitors in 2000, compared to an estimated 2,400 visitors in 1990. The dramatic increase in cave visitation in 1999 is attributed to the *Arizona Highways* article on Coronado Cave mentioned above. Figure 5 depicts visitation to Coronado Cave between 1990 and 2000.

Hiking is a popular visitor activity. Some popular trails are described below. The four trails in the memorial are predominantly in the oak-Mexican piñon-juniper woodland association. The trails to the picnic area and to Coronado Cave also traverse a portion of the Arizona sycamore-Arizona walnut-oak riparian association.

- Joe's Canyon trail, 3.1 miles long, starts just west of the visitor center, passes through the saddle at the top of Smuggler's Ridge and joins with the Coronado Peak trail to the Montezuma Pass parking area.
- Yaqui Ridge trail, 1 mile long, descends from Joe's Canyon trail to International Boundary Marker 102 at the southwestern corner of the national memorial. This trail is the southernmost point of the 790-mile Arizona Trail, described below.
- Crest Trail, 2 miles long within the memorial, extends 24 miles from the Montezuma Pass parking area to Fort Huachuca. Also part of the Arizona Trail, the Crest Trail is a popular route to Miller Peak in Coronado National Forest.
- The 790-mile-long Arizona Trail starts in Coronado National Memorial at marker 102 on the Mexican border and runs the entire length of Arizona to the Arizona-Utah state line. Parts of some other trails identified above have been incorporated into the Arizona Trail route.

Some visitors use national memorial facilities, including the road to Montezuma Pass or the Crest Trail, for access into

Coronado National Forest, which is north and west of the memorial.

FIGURE 4: VISITATION TO CORONADO NATIONAL MEMORIAL BASED ON TRAFFIC COUNTS

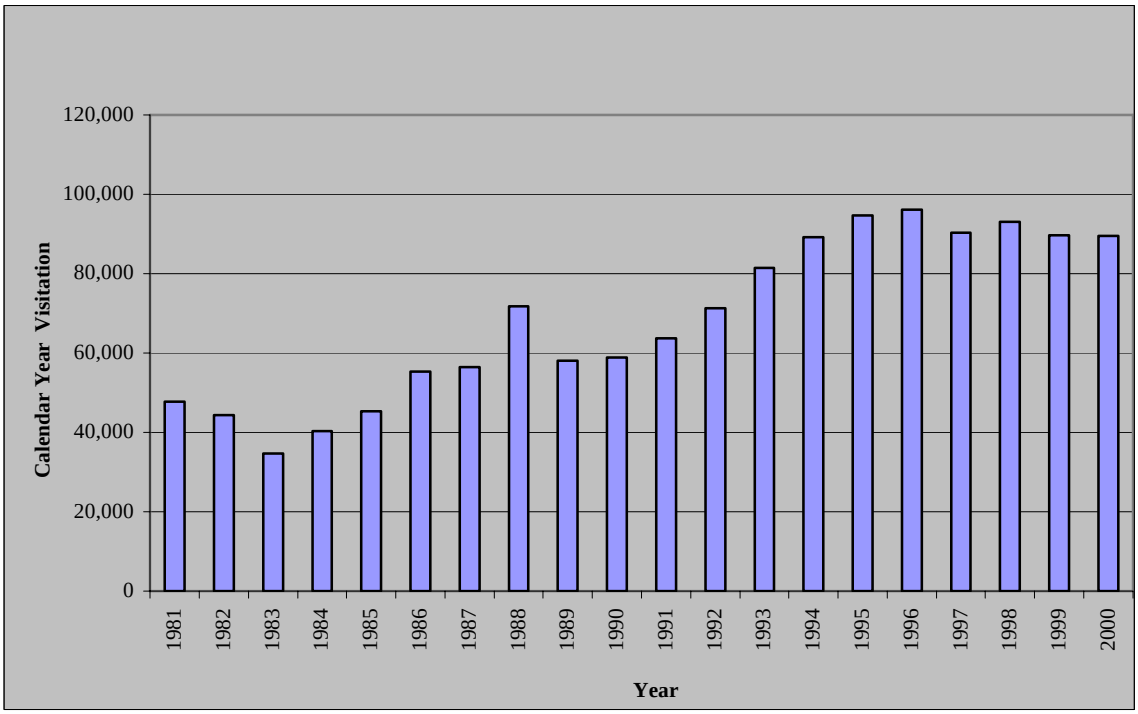
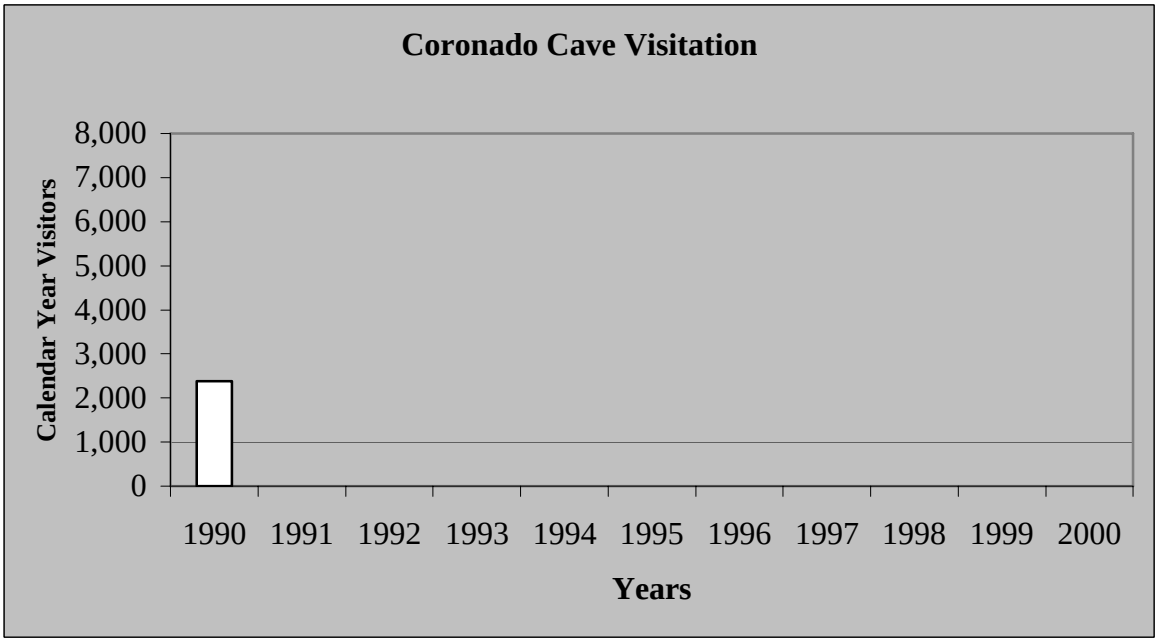


FIGURE 5: VISITATION TO CORONADO CAVE IN CORONADO NATIONAL MEMORIAL



VISITOR SERVICES AND INTERPRETATION

At the visitor center, a staff member at the desk offers orientation, information, and visit planning. Coronado's expedition is described in a video and in exhibits of artifacts and replicas. The bookstore offers materials about the memorial, its natural and cultural resources, and the exploration of North America. Outside, a short interpretive trail identifies some native plants of the area. Wayside exhibits about Coronado's expedition are found at Montezuma Pass and along the Coronado Peak trail. In addition, the staff works extensively on national memorial themes with groups and schools through the outreach program.

VISITOR EXPERIENCE

Visitors to the Coronado National Memorial can enjoy the visitor center, see views from Montezuma Pass and Coronado Peak, and picnic, hike, and observe wildlife. About a third of the visitors come to the visitor center, and about 5.5% visit Coronado Cave.

The visitor center is too small to accommodate the existing level of visitation. Constraints include a lack of appropriate indoor space for hosting large groups that visit the memorial.

The two grazing allotments cover 39% of the national memorial. Interactions between visitors and cattle occur in and around the grazing areas. During scoping for the *Livestock Management Plan* and for this document, a number of complaints were received about the conflict between recreational use and livestock. It is expected that increasing demands for activities such as hiking, birding, and biking will result in more visitors being present in the grazing allotments.

VISITOR SAFETY

The road to Montezuma Pass is paved from Arizona Highway 92 to 1 mile west of the visitor center. From there to the top of the pass, it is a narrow, steep, mountainous dirt and gravel road with tight switchbacks. Some visitors have said they feel uncomfortable driving their vehicles to Montezuma Pass because of the winding, rough road and the steep dropoffs without guardrails. Despite these conditions, accidents are rare on this low-speed road, and the few accidents that have occurred were not serious.

The memorial is in an area frequently used for smuggling undocumented aliens and illegal drugs. This creates a potential danger to visitors; however, they usually are unaware of these activities except for infrequent encounters with undocumented aliens asking for rides. There has been only one serious incident of visitors encountering smugglers: a hiker was assaulted at Montezuma Pass, and her vehicle was stolen.

LOCAL ATTRACTIONS AND OTHER RECREATIONAL OPPORTUNITIES

Several other attractions and recreational opportunities in southern Cochise County attract visitors to the region. Some of them are listed below. People who visit these places often include Coronado National Memorial in their itinerary.

Kartchner Caverns State Park, about 35 miles north of the memorial on Arizona Highway 90, opened to the public in November 1999. The caverns contain about 13,000 feet of passages and two rooms as large as football fields. Tours of the caverns and their multi-colored formations are available to the public.

San Pedro Riparian National Conservation Area is about 10 miles east of the memorial. The conservation area contains about 40 miles of the upper San Pedro River, extending from the United States–Mexico border north almost to St. David. The national conservation area, which was designated by Congress on November 18, 1988, is administered by the Bureau of Land Management, U.S. Department of the Interior. The ***San Pedro Trail*** parallels the river though most of the national conservation area. Nonmotorized activities are available there, including birding, hiking, bicycling, and horseback riding. When completed, it will be about 30 miles long.

Ramsey Canyon Preserve, owned by The Nature Conservancy, is known for its scenic beauty, diverse plant and animal life, and excellent birding opportunities. It is about 3 miles west of Arizona Highway 92, about midway between the national memorial and Sierra Vista.

Tombstone, about 35 miles northeast of the memorial, is best known for its silver-mining history and the 1881 gunfight at the OK Corral. The shootout, symbolizing the town's reputation for lawlessness, is reenacted daily. The Tombstone Courthouse (1882) has been designated a state historic park, and the Tombstone Historic District is a national historic landmark. Sites in Tombstone listed on the National Register of Historic Places are Saint Paul's Episcopal Church, Tombstone City Hall, the Tombstone Courthouse, and Tombstone Historic District.

The Arizona Trail, mentioned previously, extends from the Arizona–Utah state line to the United States–Mexico border at Coronado National Memorial. Trail users can hike, ride horseback, cross-country ski, and go mountain biking except in wilderness and specially managed areas. Numerous private, local, state, and federal organizations, including the National Park Service, are working with the Arizona Trail Association to complete the trail.

Fort Huachuca, established in 1877 as a base for American soldiers fighting in the Indian Wars, was home to the Buffalo Soldiers. That African-American cavalry served with General Pershing when he chased Mexico revolutionary leader Pancho Villa in 1916. Areas of the fort outside of the firing ranges and impact areas are typically available for recreational activities, including birding, hiking, horseback riding, golfing, fishing, and hunting.

Coronado National Forest, (mentioned earlier) north and west of the memorial, is a popular location for hiking, camping, hunting, and fishing.

SOCIOECONOMIC ENVIRONMENT

The socioeconomic study area for this plan primarily includes Cochise County, Arizona.

DEMOGRAPHICS AND ECONOMICS

Cochise County, which encompasses 6,215 square miles, is as large as Rhode Island and Connecticut combined. Most information in this section is from the U.S. Bureau of the Census.

The county's history is tied to mining, chiefly in Tombstone and Bisbee, and to agriculture, particularly livestock. Fort Huachuca provides military employment and also is one of the largest civilian employers in southern Arizona. Other major industries in the county are aerospace, information technology, farming and ranching, and tourism. In addition to the military, some major employers are the University of Arizona, Aegis Communications Group, Inc., several engineering firms that serve the military (Science Applications International Corporation and TRW, Inc.), and Wal-Mart. The county also has a large retired population; more than 25% of its citizens are older than 54.

The 2000 census showed a population in Cochise County of 117,755. This represents approximately 3% of the population of Arizona. Approximately 60% of county residents live within seven cities, as listed in table 12.

Arizona's population grew 30% between 1990 and 2000, and the population of Cochise County grew by 20.1%. Growth in the county was not equally distributed by age; the age groups 35–54, 55–64, and 65+ all grew between 35% and 40%. The 5–19 age group increased by 16%, the 5 and under group grew by only 6%, and the 20–34 age group dropped by more than 3%.

TABLE 12: POPULATION OF COCHISE COUNTY, ARIZONA, YEAR 2000 CENSUS

Location	Total Population	% of County Population
Benson	4,711	4.0
Bisbee	6,090	5.2
Douglas	14,312	12.2
Huachuca City	1,751	1.5
Sierra Vista	37,775	32.1
Tombstone	1,504	1.3
Willcox	3,733	3.2
Smaller towns and unincorporated areas	47,879	40.7
Total	**117,755**	**100.0**

The total employment in Cochise County from June 2000 through May 2001 was about 38,000 people. Countywide unemployment during this period varied from 4.1% in October 2000 to 5.1% in February 2001. The highest unemployment rates, which were in Douglas, ranged from 8.5% to 10.5%. Sierra Vista and Bisbee, the two cities closest to Coronado National Memorial, consistently had unemployment rates at or below the countywide levels.

From May 2000 through April 2001, sales in Cochise County totaled about $700 million. Restaurant and bar sales were 12% to 15% of this amount, and the rest was retail sales.

Coronado National Memorial receives law enforcement services from the Cochise County Sheriff's Office and fire protection from the U.S. Forest Service, Palominas Volunteer Fire Department, and Fry Fire Department. The memorial is in the Palominas School District.

Coronado National Memorial Economics

Yearly administrative costs at the national memorial are about $740,000. The current national memorial staff comprises 12 full-time equivalent positions.

In 1995 the National Park Service prepared a socioeconomic assessment of Coronado National Memorial. The assessment concluded that memorial visitors spend about $81.50 per person-day. Based on a multiplier of 1.14, visitor spending generated about 47 jobs in Cochise County.

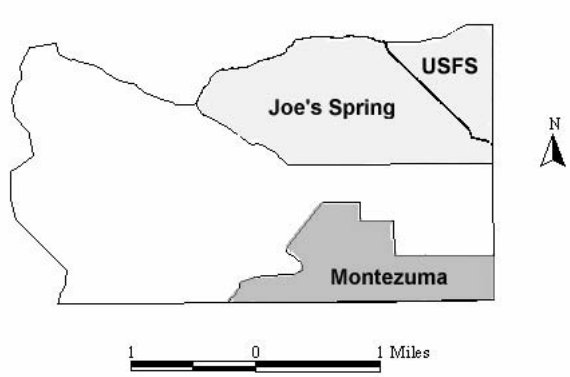
Grazing

The legislation that established Coronado National Memorial said that grazing could continue if it did not interfere with recreational development, as follows:

> Grazing of livestock within the memorial area to the extent now permitted within the said area when such grazing will not interfere with recreational development authorized by this act; and . . .

Livestock grazing was eliminated on the former Grubstake and Lone Mountain allotments in the west part of the memorial partly because of conflicts with recreation. The two remaining grazing allotments, Joe's Spring and Montezuma, cover 39% of the memorial.

FIGURE 6: GRAZING ALLOTMENTS



The total area of the Joe's Spring allotment is 1,480 acres. This includes 1,143 acres within the memorial and 337 acres in U.S. Forest Service lands adjacent to the memorial's northeast boundary. The two allotments are shown in figure 6, including the U.S. Forest Service portion of the Joe's Spring allotment. The memorial boundary is shown in bold.

The Joe's Spring allotment, which has been active since the 1930s, has been used by a single family. Until recently, the annual stocking rate for this allotment was 432 animal unit months (AUMs). The new *Livestock Management Plan* stipulates that the stocking rate in this unit be reduced to 214 animal unit months by 2006 (NPS 2000b).

The Montezuma allotment, which covers 668 acres, has not been stocked since 1990. The new grazing plan would reduce the stocking rate for this unit to 126 AUMs if it was returned to use.

Until 1992, the U.S. Forest Service administered grazing in Coronado National Memorial under a memorandum of understanding with the National Park Service. That agreement expired in 1992, and since then the National Park Service has directly managed cattle use and permits within the national memorial.

Cochise County contains about 330 commercial ranches, with an average cattle herd of 225 to 250 head (Arizona Regional Image Archive 1999a). This computes to a countywide total of 74,250–82,500 head. The same source cites an average carrying capacity for ranches in the county of 8.9 animal units per section (640 acres), which works out to one animal unit per 72 acres.

LAND USE AND TRENDS

About 41% of Cochise County is privately owned (Arizona Regional Image Archive 1999a). This is high compared to a statewide private ownership of 18%. The federal government is the primary landowner in both the county and the state.

The most recent forest plan of Coronado National Forest emphasizes improving recreation opportunities, wildlife habitats, and watershed

conditions as appropriate (Forest Service, USDA 1986a).

Land east of Coronado National Memorial is used primarily for agriculture, with some agricultural land having been converted to residential use. According to the *Southern San Pedro Valley Area Plan* (S. San Pedro Citizen Planning Committee 2001), residential development is mostly made up of large-lot developments of 4 acres or more. More intensive development is occurring in Miracle Valley, Palominas, and the Rancho Palominas Subdivision.

The 2001 *Southern San Pedro Valley Area Plan* envisions some growth in rural areas, with community character being retained. The plan suggests zoning 200 acres for commercial development, 180 acres of which currently are vacant. The plan contains policies for minimizing light pollution and for keeping important riparian corridors available for groundwater recharge.

ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

BACKGROUND

The alternatives in this document are intended to establish broad management guidelines. The general nature of the alternatives requires that the analysis of impacts also be general. This means that the National Park Service can make reasonable projections of likely impacts, but these are based on assumptions that may prove not to be accurate in the future.

As a result, this *General Management Plan / Environmental Impact Statement* is programmatic, presenting an overview of the potential impacts relating to each alternative. It will serve as a basis for NEPA documents prepared to assess subsequent developments or management actions. If and when specific NPS development or other actions are proposed as a result of this *General Management Plan / Environmental Impact Statement* for Coronado National Memorial, NPS staff will determine whether more detailed environmental documentation is needed, consistent with the provisions of the National Environmental Policy Act.

Following this introduction, the methodology used in the environmental impact analysis is presented. The impact analysis sections are organized by alternative. The first analyzed is alternative A (the no-action or existing management direction alternative), followed by the "action" alternatives B, C, D, and E. The potential effects on natural resources are discussed, followed by the effects on cultural resources, visitor understanding, and the socioeconomic environment. Each discussion includes cumulative effects and conclusions. The environmental effects are compared in table 9, page 77.

CUMULATIVE EFFECTS

Definition

A cumulative effect is described in the regulations of the Council on Environmental Quality (CEQ), which implement the National Environmental Policy Act of 1969 (42 USC 4321 *et seq.*). The CEQ regulations require that cumulative effects be assessed in the decision-making process for federal projects and that there be a description of how the cumulative effects for a particular project were determined. A cumulative impact is defined in regulation 1508.7 as follows:

> A "cumulative impact" is the impact on the environment which results from the incremental impact on the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Plans Considered for Cumulative Effects Analysis

It was necessary to identify other ongoing or reasonably foreseeable future projects at Coronado National Memorial and in the surrounding region. The region, or assessment area, covers Cochise County, Coronado National Forest, and the San Pedro National Conservation Area. Projects were identified through correspondence, Internet sites, and meetings with county and city governments and with other federal land managers. Any planning or development activity that is being implemented or will be implemented in the reasonably foreseeable future was considered a cumulative action. The plans considered are described below.

Livestock Management Plan (NPS 2000b). Since their arrival in the 1500s, livestock made a significant impact on the natural landscape of southeastern Arizona, particularly during the late 1800s and early 1900s. Improper livestock management stripped the grasslands of their vegetation, increased woody plant production, caused massive arroyo cutting, and facilitated soil erosion (Hastings and Turner 1965).

A major drought in the late 1800s reduced livestock numbers by 50%–75% and contributed to the degradation of native vegetation. Coronado National Forest was established in the early 1900s, making available for the first time the means to manage livestock use on public lands. Allotments were established and fenced. Permits generally were issued to the ranchers who had traditionally used the areas.

The National Park Service will work toward permanently retiring the remaining grazing allotments in the national memorial as opportunities arise to do so through mutual agreement with the permittees. Until this can be accomplished, this plan will serve to moderate the effects of grazing. The proposal, as described in the *Finding of No Significant Impact* (NPS n.d.) has intensified grazing management. The four key components of the plan include (a) reducing animal unit months so that impacts on native vegetation will be more moderate, (b) adjusting the season of use to avoid grazing during vegetative growing seasons, (c) implementing a comprehensive vegetation monitoring plan, and (d) providing flexibility of use in both the number of animal unit months and the season of use, based on environmental indicators. All costs incurred by the National Park Service in managing this special use are being billed to the permittee.

***Coronado National Forest, Land and Resource Management Plan* (Forest Service, USDA 1986).** The forest lies on the north and west sides of Coronado National Memorial. Its most recent forest plan contains the following major points:

- Equalize permitted grazing use and range carrying capacity within 10 to 15 years, and improve rangeland conditions.
- Improve forest-wide watershed conditions.
- Improve the condition of riparian habitats and increase their productivity.
- Recommend the addition of 62,000 acres to the wilderness system, and provide for a higher quality of recreational experience.
- Improve the developed recreational experience by increasing coordination with other agencies and the private sector in constructing new recreation sites, rehabilitating existing recreation sites, and implementing capacity controls.
- Enhance dispersed recreation experiences with improved public access and designation of zoological-botanical areas.
- Limit motorized vehicle use to designated trails and roads.
- Promote the conservation of state and federally listed threatened and endangered species.
- Improve fish and wildlife habitats by balancing successional stages of vegetation through commercial timber sales, fuelwood harvest, prescribed burning, coordination with other resource activities, and direct habitat improvement.
- Provide a balance between the production of commodities such as wood products, developed recreation opportunities, livestock grazing, mineral production, and the protection of amenities such as scenic quality, wildlife habitat, diversity, riparian condition, wilderness opportunity, watershed condition, and dispersed recreation opportunities.

In addition to the actions in the plan, the Forest Service is constructing a trail system along the eastern side of the Huachuca Mountains that may eventually connect to the

memorial's boundary near its northeast corner.

***East Huachucas Strategy Draft* (Forest Service, USDA 1997).** This plan of the Sierra Vista Ranger District, Coronado National Forest focuses on the east side of the Huachucas from the crest of the mountains on the west to the Coronado National Forest boundary on the east. The area, which is bounded on the north and northwest by Fort Huachuca and on the south by Coronado National Memorial, covers 22,000 acres, of which 12,000 acres (roughly the western half) is the congressionally designated Miller Peak Wilderness Area. The wilderness area is managed with a preservation philosophy rather than the multiple resource use policy of nonwilderness forestlands. This plan identifies actions needed to improve recreation and resource conditions on the remaining 10,000 nonwilderness acres. In its stewardship of this area, the U.S. Forest Service has the following goals for the future of recreation and resource integrity:

- Management emphasis for the east side of the Huachucas will focus on maintaining and improving biological diversity and providing high quality recreational experiences.
- Scenic and historic settings will be preserved.
- Urbanization around the foothills of the east Huachucas requires planning and management that includes consideration of biological, sociological, and economic needs.
- Future planning and management must recognize and adhere to the boundaries set in this plan for scales of development so that the desired habitat and recreation settings are maintained for future generations.

The following are examples of plan actions:

- New facilities will be rural or semiprimitive in character.
- Construct a low elevation trail that connects the various existing canyon trails. This "perimeter" trail would provide loop trail opportunities for hiking, horseback riding, and mountain biking.
- Define and delineate low elevation camping and picnicking areas.
- Protect existing wildlife corridors from the mountain range to the adjacent land during future planning and management.
- Work with officials from Fort Huachuca to provide legal trail access from the fort to the forest and vice versa. This would open extensive trail opportunities to the public.

The Final Safford District Resource Management Plan and Environmental Impact Statement (BLM 1990b). This plan of the Safford District, Bureau of Land Management, describes and analyzes alternative plans for managing about 1.4 million acres of public land in southeastern Arizona. It covers all BLM-managed land in Graham, Greenlee, and Cochise Counties and portions of Pinal, Pima, and Gila Counties.

The selected plan, alternative A, will guide the management of the lands for 15 years. The preferred alternative provides a balanced approach to multiple use management and will protect sensitive resources that cannot tolerate disturbance from other activities. It also provides for the consumptive use and development of other resources, as follows:

- Three research natural areas of critical environmental concern will be designated as recommended in the *San Pedro River Riparian Management Plan and Final Environmental Impact Statement* (BLM 1989). Management plans will be prepared for each area after designation.
- Portions of the Gila and San Francisco Rivers have been recommended by the National Park Service for further study as potential candidates for designation under the Wild and Scenic Rivers Act. Suitability

determinations will be prepared at a later date.

- The *Arizona Wetland Riparian Management Strategy* (BLM 1990a) has as a primary goal "to improve water quality and riparian areas to good or better ecological conditions by 1997 for 75 percent of BLM-administered streams by implementing grazing systems and strategically planned enhancement projects." The following are examples of how BLM policies support the implementation of this goal.
  - ✓ Achieve riparian area management and maintenance objectives through the management of existing uses wherever feasible.
  - ✓ Prescribe the management of riparian values based on site-specific characteristics and settings.
  - ✓ Give special attention to monitoring and evaluating management activities in riparian areas, and revise management practices where site-specific objectives are not being met.
  - ✓ Identify, encourage, and support research and studies needed to ensure that riparian area management objectives can be properly defined and met.
- The Safford plan's goal for the management of riparian areas is to maintain or improve 75% of the acreage of riparian vegetation on public lands within the district in good or excellent condition by 1997.
- The Bureau of Land Management's goal is to minimize soil erosion and rehabilitate eroded areas to maintain and enhance watershed condition and reduce nonpoint source pollution that can result from rangeland management and use activities. The Safford plan contains specific actions to address soil erosion and salinity management.
- As required by law, the Bureau of Land Management will manage vegetation for its use while maintaining sufficient ground cover to maintain and enhance watershed condition and reduce nonpoint source pollution from range land management and use activities.
- The Bureau of Land Management will designate 13 areas of critical environmental concern totaling 40,805 acres (31,949 acres of public land) to protect important natural and cultural resources.
- The plan includes developing coordinated resource management plans to direct multiple use programs on public lands in the Aravaipa Creek Watershed, Muleshoe Ranch, and Bear Springs Flat areas to direct the development of program activities toward the maintenance and enhancement of watershed condition.
- The plan also includes managing cultural resources for information potential, public values, and conservation.

San Pedro River Riparian Management Plan and Final Environmental Impact Statement. (BLM 1989). The San Pedro riparian area, administered by the Bureau of Land Management, contains about 40 miles of the upper San Pedro River extending from several miles south of Saint David to the border with Mexico. It was designated by Congress as a national conservation area on November 18, 1988. From the eastern boundary of the Coronado National Memorial, the closest part of the national conservation area is about 10 miles to the east. This area was set aside to protect and enhance the riparian ecosystem and related resources.

The plan notes four areas of the San Pedro that are potential areas of critical environmental concern: San Pedro Riparian, St. David Cienega, San Pedro River, and San Rafael.

The proposed action of the San Pedro River plan will permit developed sites outside the

riparian areas to the extent of four large sites and seven small ones. Overnight camping by permit will be allowed. The proposed action emphasizes actions to protect or enhance vegetation, wildlife habitat, water, and cultural/paleontological resources. Livestock grazing on the original acreage has been prohibited for the life of the plan.

Upper San Pedro Partnership. This group is a consortium of local, state, and federal agencies (including the National Park Service), organizations, and landowners whose goal, according to its brochure, is to "ensure that a long-term groundwater supply is available to meet the needs of current and future residents and the San Pedro Riparian National Conservation Area." The three strategies of the partnership are to do the following:

- Reduce water consumption to the minimum necessary to meet the needs of people and nature.
- Reclaim used water (effluent) that would otherwise be wasted.
- Augment existing water resources through improved rainfall harvesting techniques.

Southern San Pedro Valley Area Plan, Public Review Draft (2001). The goal of this plan, (produced by the Southern San Pedro Valley Area Plan Citizen Planning Committee, Cochise County Planning and Management Information Systems Staff, Cochise County Planning Commission, and Cochise County Board of Supervisors) is to provide guidelines for the future development of land use in the plan area. The boundaries of the Palominas Fire District are the boundaries of the plan. This plan and land use map will be amendments of Cochise County's comprehensive plan.

At the beginning of the planning process, more than 1,200 surveys were mailed to property owners in the planning area. Most of the responses to the survey expressed a preference for retaining the rural character of the area.

Business and Industry — 200 acres zoned; 180 of which remain vacant.

Most of this land is on the north side of Arizona Highway 92 and on a quarter-section on the north of AZ 92 about 0.25 mile east of the San Pedro River

The goal is that new nonresidential development would complement the rural, small town, recreational and ranching character of the valley

Industrial uses are considered more suitable in the Sierra Vista employment center, where infrastructure exists to support such activities

Residential Neighborhoods — Residential development is made up of "mostly . . . large lot development of 4 acres or larger with the exception of the population centers of Miracle Valley, Palominas, and the Rancho Palominas Subdivision."

Densities are defined as follows:

High density: less than 36,000 square feet lot size.

Medium density: 36,000 square feet but less than 4 acres.

Rural density: 1 residence per 4 acres and grazing land for properties likely to remain as agricultural uses on a voluntary basis

The Southern San Pedro Area Plan envisions some growth in rural areas while maintaining community character. It suggests zoning 200 acres for commercial development, 180 acres of which is vacant. The plan contains policies for keeping important wash corridors available for groundwater recharge and for minimizing light pollution.

Infrastructure within U.S. Border Patrol, Naco-Douglas Corridor, Cochise County, Arizona. To help fulfill the U.S. Border Patrol's mission to reduce illegal immigration

and drug trafficking along the U.S.–Mexico border, infrastructure projects that have been approved by the Immigration and Naturalization Service have been analyzed under the NEPA process through the preparation of an environmental assessment. The Border Patrol proposes to improve 280 miles of road along the Mexico border and install other infrastructure components. Roads would be widened, and culverts, bridges, and low-water crossings would be added. These actions would promote safer driving and enhance the Border Patrol's response capabilities.

New fencing 10–14 feet high would be erected along the border near points of entry to prevent illegal passage. Vertical lengths of 4–5-inch diameter piping about 3 feet high would be placed as vehicle barriers to impede illegal entry. These upright barriers would not prevent pedestrian or wildlife movement. In addition, stadium style lighting and cameras would be installed at key infiltration points.

In the memorial, rail-on-rail barriers would be placed in various locations near the U.S.–Mexico border, from the memorial's eastern boundary west to Smugglers Wash and at the head of Smugglers Wash. The barriers would be made of posts 4–5 feet high spaced 4 feet apart, with a rail about 3 feet above the ground level connecting the posts.

IMPAIRMENT

In addition to determining the environmental consequences of the preferred alternative and other alternatives, NPS policy (*Management Policies 2001*, § 1.4) requires that potential effects be analyzed to determine whether or not proposed actions would impair the resources of the national memorial.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid or minimize, to the greatest degree practicable, any adverse effects on the resources and values of a park system unit. However, the laws do give the National Park Service the management discretion to allow impacts on resources and values when necessary and appropriate to fulfill the purposes of a national park system unit, as long as the impact does not constitute *impairment* of the affected resources and values.

Although Congress has given the National Park Service the management discretion to allow certain impacts, that discretion is limited by the statutory requirement that a park's resources and values must be left unimpaired unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of the resources and values, including the opportunities that otherwise would be present for the enjoyment of those resources or values.

Any effect on a resource or value may constitute an impairment, but an action would be most likely to constitute an impairment if it would result in a major effect on a resource or value whose conservation would be (a) necessary to fulfill specific purposes the park unit's establishing legislation or proclamation, (b) key to the natural or cultural integrity of the park system unit or opportunities to enjoy it, or (c) identified as a goal in the general management plan of the park system unit or other relevant NPS planning documents. Impairment could result from NPS activities in management, from visitor activities, or from activities undertaken by concessioners, contractors, and others operating in the park system unit. In this document, a determination about impairment is made in the conclusion section for each appropriate topic in the "Environmental Consequences" chapter.

METHODOLOGY

HOW EFFECTS WERE ANALYZED

This section contains descriptions of the methods used to analyze the environmental consequences of each alternative. First, the methodologies and assumptions common to all topics are described, followed by the methodologies specific to individual resource topics in the following areas:

Natural Resources: air quality; cave resources; soils; vegetation; threatened, endangered, or sensitive species; water quality; and wildlife

Cultural Resources: archeological resources, historic structures, ethnographic resources, and cultural landscapes

Visitor Understanding and Recreational Resources

The Socioeconomic Environment

The potential effects are described in terms of *type* (would the effect be beneficial or adverse?) *duration* (would the effect be short term — lasting less than one year — or long term — lasting more than a year?), and *intensity* (would the effect be negligible, minor, moderate, or major?) The definitions of intensity vary by effect; separate intensity definitions have been identified for each topic analyzed.

For each resource topic, the *context* of the effect would be local (affecting resources only in the national memorial) or regional (extending beyond national memorial boundaries). This is the general definition for *local* or *regional* context; any specific aspect of what constitutes a local or regional effect for a given topic has been defined under "context" for that topic's methodology.

Where possible, mitigative measures have been specified that would avoid, reduce, or compensate for potential adverse effects.

Pursuant to NEPA requirements, the impact analyses for alternative A (the existing management direction or no-action alternative) compare resource conditions that would exist in 2020 to existing conditions in 2000. The analyses of the action alternatives (B–E) compare the conditions that would result from the alternative in 2020 to those of the no-action alternative in 2020.

It is assumed that annual visitation to the national memorial would increase between 2000 and 2020. Although the amount of increase is not known, it is assumed that the annual visitation in 2020 would be the same under all the alternatives and that the accommodation of annual visitation demand would be the same.

This plan is a management plan, rather than an action or implementation plan. It is prescriptive, prescribing management actions to guide the managers of Coronado National Memorial in managing the memorial's resources.

To present to decision-makers and the public an accurate idea of the environmental consequences of the alternatives, the analysis team identified potential actions that could result from the application of the management prescriptions under each action alternative and analyzed their effects as compared to conditions under the no-action alternative. The environmental consequences analyses are qualitative rather than quantitative, because the action alternatives are conceptual.

METHODS OF ASSESSING EFFECTS ON NATURAL RESOURCES

Air Quality

Air quality refers to the concentration of contaminants present in either indoor or outdoor air. The presence of a variety of air pollutants is measured and regulated by state agencies according to the Clean Air Act. No air quality monitoring takes place in the memorial, and air quality is analyzed by qualitative estimates of the presence of contaminants that could be detected by staff and visitors. Parameters considered are particulate matter (dust), emissions from equipment (fumes), and odor.

Context — Local effects on air quality would be those occurring within the national memorial. Regional effects would extend beyond the memorial's boundaries.

Intensity — The intensity of impacts on air quality has been evaluated as follows:

Negligible: No changes would occur, or changes in air quality would be below or at the level of detection. If detected, the effects would be slight.

Minor: The changes in air quality would be measurable but small and localized. No mitigative measures would be necessary.

Moderate: The changes in air quality would be measurable and would have consequences, although the effect would be relatively local. Mitigative measures would be necessary and probably would be successful.

Major: The changes in air quality would be measurable, would have substantial consequences, and would be noticed regionally. Mitigative measures would be necessary, and their success could not be guaranteed.

Type — Beneficial effects would improve air quality by reducing the concentrations of pollutants or nuisance dust; adverse effects would degrade air quality by increasing the presence these contaminants.

Duration — A short-term effect on air quality would be highly transient and persist only during activities generating dust or fumes. A long-term effect generally would result from changes in use patterns or the implementation of new actions and would persist beyond the period of dust or fume generation.

Cave Resources

Because caves form over millions of years, and because of the fragile nature of the formations they contain, caves are managed as nonrenewable resources. Any effect on the cave environment is considered long term. Any interruption or change in the hydrologic conditions that have caused the cave to form is also considered when assessing impacts on caves.

Context — The cave is relatively small, and all effects to the cave and its environment would be considered localized.

Intensity — The intensity of impacts on cave resources has been evaluated as follows:

Negligible: No changes would occur, or changes in cave formations and biota would be below or at the level of detection. If detected, the changes would cause effects that would be considered slight.

Minor: The changes in cave formations and biota would be measurable but small, and localized. No cave resource protection measures would be necessary.

Moderate: The changes in cave formations and biota would be measurable. Formations would be affected by deterioration or changed

depositional patterns, but the effect would be relatively local. Cave resource protection measures would be necessary and probably would be successful.

Major: The changes in cave formations and biota would be measurable, would have substantial consequences, and would be noticeable throughout the cave system. Cave resource protection measures would be necessary, and their success could not be guaranteed.

Type — Beneficial effects would be those that would improve cave resources by limiting human influence in the cave ecosystem; adverse effects would degrade or negatively alter cave resources.

Duration — Any effect on the cave environment is considered long term.

Soils

Alternatives could affect soils by changing the likelihood and rate of erosion. The changes have been identified as either beneficial or adverse.

Quantitative analysis of soil erosion is beyond the scope of this document because of the document's prescriptive nature. A qualitative analysis of the context, intensity, and duration of the potential effects is presented here.

Context — In many cases, local effects would extend over a small area in the national memorial, such as a few feet beyond a construction site. In other cases, such as in grazing allotments, local effects could cover hundreds of acres in the memorial. Regional impacts would affect soils that extend beyond the boundaries of the national memorial.

Intensity — The intensity of soils impacts has been evaluated as follows:

Negligible: The effect would be detectable but would have no discernible effect on the rate of soil erosion and/or the ability of the soil to support vegetation.

Minor: The effects would be detectable but would not change the ability of soils to support vegetation.

Moderate: The effect would be clearly detectable and could appreciably change the rate of erosion and/or the ability of the soil to support vegetation. Mitigating measures would be needed to offset adverse effects.

Major: The action would have a substantial, highly noticeable influence on the rate of soil erosion and/or the ability of the soil to support vegetation.

Type — Beneficial effects would improve soil resources by restoring areas and limiting development; adverse impacts would deplete or negatively alter soil resources.

Duration — A short-term effect on soils would be temporary, associated with transitional types of activities such as facility construction, resulting in effects that would be reduced to negligible levels after two or three growing seasons. A long-term effect typically would last months or years, continuing to be apparent after two or three growing seasons.

Vegetation

The plant communities considered in a 1991 analysis (Ruffner and Johnson 1991) were grouped into four general vegetation types for ease of discussion: oak-Mexican piñon-juniper association, grama species mixed grass-mixed shrub association, sycamore-walnut-oak association, and honey mesquite-mixed short tree association. The qualitative analysis of vegetation relied substantially on professional judgment.

The starting point for assessing impacts is natural processes, including the size, physical foundation, and components of the natural

communities and ecosystems. The relative extent of a plant community is determined by comparing its size to that of other similar communities within a defined area. Larger areas of intact vegetation create larger areas for wildlife and for ecosystem function. Therefore, new areas of development, however small, within otherwise intact and undisturbed areas constitute a greater impact on the overall vegetation of the area than the direct impact on that particular acreage.

In efforts to restore overall vegetative integrity and ecosystem health, small areas of restoration surrounded by existing or new development would constitute a lesser beneficial effect than would restoring a small area adjacent to a larger intact community or restoring large areas with little to no surrounding impact. Radiating effects (effects resulting from human use spreading out beyond developments, including parking, housing areas, and trails) can affect plant community size and continuity: soils can be disturbed and compacted, native vegetative cover can be trampled, and the potential for the introduction and establishment of nonnative species can be increased.

The natural structure of a plant community is measured by the presence or absence of nonnative species, the opportunity for natural processes such as fire and flood to occur, and the presence or absence of natural structural layers, or strata. Biotic integrity can be defined as the ability to support and maintain a balanced, integrated, adaptive community of organisms having species composition, diversity, and functional organization comparable to that of a natural habitat of the region. Diversity and productivity are important for vegetation communities as a whole because the interaction of species and presence of different components provides for ecosystem health and habitat for other species.

The measure of these parameters includes the ability to control, eradicate, or prevent the establishment of nonnative plant species and the ability to manage vegetation with a full range of management options to maintain natural structure and diversity. For example, the presence of nonnative species decreases the value of any particular area of vegetation by altering the contribution the vegetation makes toward habitat for wildlife and other organisms. Nonnative species also alter the effects of natural processes such as flooding or fire by changing the physical characteristics of the plant community.

Context — A local effect would occur within the memorial's boundaries. Local effects would cause changes in a limited area, such as constructing a parking lot or similar facilities. Regional effects would extend beyond the boundaries of the national memorial.

Intensity — The intensity of effects on vegetation has been evaluated as follows:

Negligible: The effect would result in no measurable or perceptible changes in the size, integrity, or continuity of the plant community.

Minor: The action would have a measurable or perceptible and localized effect within a relatively small area, but the overall viability of the plant community would not be affected.

Moderate: The action would cause a change in the size, integrity, or continuity of the plant community, but the impact would remain localized. The change would be measurable and perceptible, but it could be reversed.

Major: The effect would be substantial, highly noticeable, and could permanently affect the size, integrity, continuity, productivity, and structure of the plant community.

Type — Beneficial effects would improve conditions necessary to support native vegetation by restoring areas and limiting

development; adverse impacts would deplete or negatively alter native vegetation.

Duration — A short-term effect on vegetation would be temporary (typically lasting days or weeks) and would be associated with transitional types of activities such as the generation of dust during facility construction. A long-term effect typically would last months or years.

Threatened, Endangered, or Sensitive Species

The National Park Service is mandated to protect the natural abundance and diversity of the memorial's naturally occurring communities. The ability to complete a quantitative analysis is limited by the prescriptive nature of the alternatives. To assess the effects on threatened or endangered species and species of special concern, the following had to be determined:

(a) which species are found in areas likely to be affected by management actions associated with the alternatives

(b) the habitat loss or alteration that would be caused by each alternative

(c) the displacement and disturbance potential of the actions and the species' potential to be affected by the activities

(d) the compensating or offsetting effects of proposed mitigating measures that would be associated with the alternative.

The information in this analysis was based on professional judgment and literature review.

Context —A local effect would occur within the memorial's boundaries, causing changes in a limited area; for example, constructing a parking lot or similar facilities. Regional effects would extend beyond the national memorial's boundaries.

Intensity — The intensity of effects on threatened or endangered species or species of concern has been evaluated as follows:

Negligible: No federally listed or sensitive species would be affected, or the action would affect an individual of a listed species or its critical habitat, but the change would be so small that it would not be of any measurable or perceptible consequence to the protected individual or its population. A negligible effect would equate with a "no effect" determination in U.S. Fish and Wildlife Service terms.

Minor: The action would affect an individual(s) of a listed or sensitive species or its critical habitat, but the change would be small. A minor effect would equate with a "may effect" determination in U.S. Fish and Wildlife Service terms and would be accompanied by a statement of "likely" or "not likely" to adversely affect the species.

Moderate: An individual or population of a or sensitive species, or its critical habitat, would be noticeably affected. The effect would have consequences to the individual, population, or habitat. A moderate effect would equate with a "may effect" determination in U.S. Fish and Wildlife Service terms and would be accompanied by a statement of "likely" or "not likely" to adversely affect the species.

Major: An individual or population of a listed or sensitive species, or its critical habitat, would be noticeably affected with a vital consequence to the individual, population, or habitat. A major effect would equate to a determination in U.S. Fish and Wildlife Service terms of "may effect" or "is likely to adversely affect" the species or critical habitat.

Type —Beneficial effects would protect threatened, endangered, or sensitive species or improve their habitats by restoring areas and limiting development; adverse impacts would deplete or negatively alter habitat for

threatened, endangered, or sensitive species.

Duration — A short-term effect on threatened, endangered, or sensitive species would be temporary (typically lasting days or weeks) and would be associated with transitional types of activities facility construction. A long-term effect typically would last months or years.

Water Quality

Water quality refers to the suitability of surface water for recreational use and wildlife habitat. Analyzing effects on water quality deals particularly with the enhancement or degradation of the water's quality. NPS *Management Policies 2001* require that the National Park Service take "all necessary actions to maintain or restore the quality of surface waters and ground waters within the parks consistent with the Clean Water Act and all other applicable federal, state, and local laws and regulations." The Clean Water Act requires that federal agencies "comply with all Federal, State, interstate, and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water pollution." In this document, particular consideration has been given to actions with the potential to affect the natural hydrology and surface water quality of the ephemeral streams and drainages in the memorial.

Context — A local effect would occur within the memorial's boundaries. Local effects would cause changes in a limited area, such as constructing a parking lot or similar facilities. Regional effects would extend beyond the boundaries of the national memorial.

Intensity — The intensity of effects on water quality has been evaluated as follows:

Negligible: The effect would not be detectable and would not result in a discernible change in water quality.

Minor: The effect would be slightly detectable but would not result in an overall change in water quality.

Moderate: The action would cause a change that would be clearly detectable and could have an appreciable effect on water quality.

Major: The action would result in a substantial, highly noticeable influence on water quality.

Type — Beneficial effects would lead to improved water quality; adverse effects would result in poorer water quality or the reduced ability of water to meet its beneficial use.

Duration — Short-term effects would occur during the time that the alternative was being implemented and usually would last less than two years (such as construction projects). A long-term effect would last more than two years, remaining after the alternative had been implemented. Since the full implementation of an alternative would take place over a number of years, rather than considering the effects during the full implementation of the alternative, frequently the duration of the effects of individual actions of the alternative (restoring a trail, constructing a visitor center) have been assessed.

Wildlife

Information from literature was used to assess the probable impacts on wildlife from the alternatives. Surveys of terrestrial mammals (Swann et al. 2000) and amphibians and reptiles (Swann, Alberti, and Schwalbe 2001) were relied upon for the distribution of species in the memorial and their relative abundance. Qualitative analysis relies substantially on professional judgment to reach reasonable conclusions.

The analysis of effects on wildlife was based on the following assumptions:

- The more developed an area becomes, the less valuable it is as wildlife habitat. New development would increase human presence and the potential for disturbance of soils, vegetation, and wildlife. The potential for negative wildlife interactions (such as human injury from wildlife and the introduction of unnatural food sources) also would increase. Removing development from an area would increase the value of the habitat.
- The effects of human food on the behavior, distribution, and abundance of wildlife species would continue in existing developments and would begin in new developments unless adequate facilities, education, and enforcement were available.
- Development and activities near sensitive habitat may adversely affect adjacent natural communities.
- Disturbance in or near hydrological features might reduce the productive capability associated with natural communities. Modifications that result in soil compactions, loss of riparian vegetation, and accelerated erosion and sediment transport influence important habitat characteristic such as substrate type, location, and cover. These physical aspects often determine the composition of vegetative and wildlife communities.
- Roads and trails generally form barriers for wildlife and fragment habitat.

Context — A local effect would occur within the memorial's boundaries. Local effects would cause changes in a limited area, such as constructing a parking lot or similar facilities. Regional effects would extend beyond the boundaries of the national memorial.

Intensity — Effects on biological resources are considered beneficial if an action causes no detrimental effect and results in an increase in species or habitat components, native ecosystem processes, native species richness/diversity, or native habitat quantity and quality. The intensity of effects on wildlife has been evaluated as follows:

Negligible: The action would not be detectable and would have no principal effect on biological resources.

Minor: The effect on wildlife would be slightly detectable but would not be expected to have an overall effect on the natural community structure.

Moderate: The effect would be clearly detectable and could cause an appreciable change in individual species, community ecology (for example, the different kinds of amphibians present), or natural processes such as fire.

Major: The action would result in a substantial, highly noticeable effect on natural resources. This would include substantial effects on individual species, community ecology, or natural processes.

Type — Beneficial effects would protect wildlife or improve their habitats by restoring natural processes and limiting development; adverse impacts would deplete or negatively alter wildlife resources.

Duration — A short-term effect on wildlife typically would last days or weeks and would be associated with transitional types of activities such as facility construction. A long-term effect typically would last months or years.

METHODS OF ASSESSING EFFECTS ON CULTURAL RESOURCES

The effects on archeological resources, historic structures, ethnographic resources,

and cultural landscapes were assessed as described in the following paragraphs.

The cultural resource impact analysis is described in terminology consistent with the regulations of the Council on Environmental Quality (CEQ), and it is intended to comply with the requirements of both the National Environmental Policy Act and section 106 of the National Historic Preservation Act.

The assessment of effects on cultural resources is based on the regulations of the Advisory Council on Historic Preservation (36 CFR 800), which require federal agencies to consider the effects of actions on properties included on, or eligible for inclusion on, the National Register of Historic Places and to give the advisory council a reasonable opportunity to comment. The potential effects on cultural resources were identified and evaluated by: (a) identifying the areas that could be affected, (b) identifying cultural resources present in the area of potential effects that either are listed on or eligible for listing on the National Register of Historic Places, (c) identifying the extent and type of effect, (d) assessing those effects to avoid, reduce, or mitigate adverse effects according to procedures established in the advisory council's regulations, and (e) considering ways to avoid, reduce, or mitigate adverse effects.

This also applies to properties not formally determined eligible, but which are considered to meet eligibility criteria. All NPS undertakings affecting historic properties are subject to the provisions of the 1995 programmatic agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers. Applicable legislation and regulations and specific management procedures regarding cultural resources are detailed in the NPS Director's Order 28, "Cultural Management Guideline" (NPS 1998a).

Under the advisory council's regulations, a determination of either "adverse effect" or "no adverse effect" must be made for affected cultural resources eligible for listing on the national register. An adverse effect occurs whenever an action alters, directly or indirectly, any characteristic of a cultural resource. Examples of alteration would be diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects that would be caused by the preferred alternative that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5, "Assessment of Adverse Effects"). A determination of "no adverse effect" means that there would be an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion on the national register.

CEQ regulations and the NPS Director's Order 12, *Conservation Planning, Environmental Impact Analysis and Decision-making* also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact (for example, reducing an impact from major to moderate or minor). However, any resultant reduction in the intensity of an impact from mitigation would be an estimate of the effectiveness of the mitigation under the National Environmental Policy Act only. This would not suggest that the level of effect as defined by section 106 would be similarly reduced. Although adverse effects under section 106 may be mitigated, the effect would remain adverse.

A section 106 summary is included in the analysis of effects. These summaries are intended to meet the requirements of section 106 by assessing the effects of the actions on cultural resources that are either listed on or eligible to be listed on the National Register of Historic Places, on the basis of the criteria of effect and adverse effect in the advisory council's regulations.

This methodology applies to four types of cultural resources: archeological resources, historic structures, ethnographic resources, and cultural landscapes.

Context — The affected area is the memorial and Cochise County. Cultural resources impacts should not extend beyond these areas.

***Type* —** Beneficial effects on cultural resources would be greater protection and preservation of the resource. Adverse effects would occur whenever an action would directly or indirectly alter any characteristic of a cultural resource that would qualify it for inclusion on the National Register of Historic Places (for example, by diminishing the integrity of its location, design, setting, materials, workmanship, feeling, or association). This definition follows the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5).

Duration *(except for ethnographic resources)* — Short-term impacts would be less than one year because most construction is generally completed within a year's time and would last only until all construction-related action items were completed. Long-term impacts would extend beyond one year and have a permanent effect on cultural resources.

Archeological Resources

Certain important research questions about human history can be answered only by the actual physical material of cultural resources. Archeological resources have the potential to answer such research questions in whole or part. Archeological resources typically are considered eligible for inclusion on the National Register of Historic Places because they have yielded, or may be likely to yield, information important in history or prehistory. An archeological site can be nominated to the national register in one of three historic contexts or levels of significance: local, state, or national (National Register Bulletin 15, *How to Apply the National Register Criteria for Evaluation.*)

For the purposes of analyzing the effects on archeological resources, thresholds of change for the intensity of an impact are based on the potential of each site to yield information important in prehistory or history, as well as on the probable historic context of the site. The intensity of impacts on archeological resources also relates to the importance of the information they contain and the extent of disturbance or degradation.

***Intensity* —** Consistent with CEQ regulations, the intensity of the effects on archeological resources has been evaluated as follows:

Negligible: The effect would be so slight as to be barely measurable with no perceptible consequences and no meaningful implications. It would be confined to a small area, or the area affected would be a single contributing element of a larger national register district or archeological site(s) with low data potential.

Minor: The action would affect an archeological site with little or no potential to yield information important in history or prehistory. The affected archeological resource generally would be ineligible to be listed on the national register. The effect would be perceptible and measurable but would remain local and confined to a single contributing element of a larger national register district or archeological site.

Moderate: The effect would be readily apparent. The action would affect an archeological site or sites with local or state context and with potential to yield information important in history or prehistory.

Major: The effect would be severe or of exceptional benefit. The action would

affect an archeological site or sites with national historic context and with potential to yield important information about human history or prehistory.

Historic Structures

To be listed on the National Register of Historic Places, a structure must be associated with an important historic context; that is, it must possess significance (the meaning or value ascribed to the structure), and it must have integrity of the features necessary to convey its significance: location, design, setting, workmanship, materials, feeling, and association (as described in *National Register Bulletin 15, How to Apply the National Register Criteria for Evaluation).*

Intensity — The intensity of the potential impacts on historic structures has been evaluated as follows:

Negligible: The effect would be at the lowest levels of detection; it would be barely perceptible and not measurable.

Minor: The action would not affect the character-defining features of a structure listed on or eligible for the National Register of Historic Places.

Moderate: The effect would be an alteration of character-defining features of a structure, but the integrity of the resource would not be diminished to the extent that its national register eligibility would be jeopardized.

Major: The action would alter a character-defining feature of a structure, diminishing its integrity to the extent that it would no longer be eligible for listing on the national register.

Ethnographic Resources

Ethnographic resources are resources that and are important in maintaining the continuing cultural identity of the community and to which communities ascribe cultural significance. Only members of the community to which the resources hold cultural value can identify ethnographic resources and determine the potential effects on them. Ethnographic resources are considered eligible for inclusion on the national register as traditional cultural properties when they are rooted in a community's history and meet the criteria for evaluation and integrity.

After initial consultation meetings with representatives of American Indian tribes with possible traditional associations with lands and resources in Coronado National Memorial, the National Park Service has determined that the tribes listed on this page are most closely associated with resources of the memorial that could be affected by NPS actions.

Duration — Because the ethnographic resources identified by the tribes are important in each tribe's history and because the resources are interconnected with places and resources located throughout customary tribal lands, any impacts on ethnographic resources would be regional in scope. Effects on the resources also would affect the communities to which they are perpetually tied. Therefore, the duration of impacts on ethnographic resources would be long term.

Tribes Associated with Resources in Coronado National Memorial
Ak-chin Indian Community
Fort McDowell Mojave-Apache Community
Fort Sill Apache Tribe of Oklahoma
Hopi Tribe
Mescalero Apache Tribe
Pascua Yaqui Tribe of Arizona
Pueblo of Zuni
Salt River Pima-Maricopa Indian Community
San Carlos Apache Tribe
Tohono O'odham Nation
Tonto Apache Tribe
White Mountain Apache Tribe

Yavapai-Apache Tribe

Intensity — The intensity of effects on ethnographic resources may relate to access and use of, as well as changes to, traditionally important places. Although the tribes themselves did not identify the intensity of potential impacts on ethnographic resources, the National Park Service has defined the intensity as follows:

Negligible: The effect would be at the lower levels of detection.

Minor: The effect would be slight, but detectable.

Moderate: The effect would be readily apparent.

Major: The effect would be severely adverse or exceptionally beneficial.

Any adverse impacts on ethnographic resources would be readily apparent to the tribes to which the resources hold cultural significance. In most cases, because effects on these resources would affect cultural identity and ways of life, the intensity of most effects, whether positive or adverse, would be moderate to major.

Coronado National Memorial contains no traditional cultural properties (ethnographic resources eligible for listing on the National Register of Historic Places); therefore, the impact sections for this topic in each alternative will not contain a "Section 106 Summary."

Cultural Landscapes

Cultural landscapes impart a living record of an area's past, a visual chronicle of its history. Shaped through time by historical land management practices, by politics and property laws, by levels of technology and economic conditions, cultural landscapes are the result of long interaction between people and the land, the influence over time of human beliefs and actions on the natural landscape. However, the dynamic nature of modern human life contributes to the continual reshaping of cultural landscapes, making them a good source of facts about specific times and places. At the same time, the long-term preservation of cultural landscapes is a challenge.

For a cultural landscape to be listed on the National Register of Historic Places, it must possess significance (the meaning or value ascribed to the landscape) and have integrity of the features necessary to convey its significance. The character-defining features of a cultural landscape are its spatial organization and land patterns, structures and buildings, site furnishings and objects, circulation patterns, topography, vegetation, and water features (USDI 1996).

Intensity — The intensity of effects on cultural landscapes has been evaluated as follows:

Negligible: The effect would be at the lowest levels of detection; it would be barely perceptible and not measurable.

Minor: The action would not affect the character-defining features of a cultural landscape listed on or eligible for listing on the National Register of Historic Places.

Moderate: The action would alter a character-defining feature of the cultural landscape but would not diminish the integrity of the cultural landscape to the extent that its national register eligibility would be jeopardized.

Major: The action would alter a character-defining feature of a the cultural landscape, diminishing its integrity to the extent that it would no longer be eligible for listing on the national register.

Mitigation and Section 106

Mitigation for NEPA purposes in this environmental impact statement includes avoiding, rectifying, or compensating for the impact. Every effort would be made to avoid adverse impacts on cultural resources. When avoidance was neither feasible nor prudent and the undertaking could result in adverse impacts, a number of mitigating measures might be employed.

The Council on Environmental Quality calls for a discussion of the *appropriateness* of mitigation, and the NPS *Handbook to Director's Order 12, Conservation Planning, Environmental Impact Analysis, and Decision Making* requires an analysis of the *effect* of mitigation. The resulting reduction in intensity from mitigation is an estimate of the effectiveness of mitigation under the National Environmental Policy Act. It does not suggest that the level of effect as comprehended by section 106 of the National Historic Preservation Act be similarly reduced. Although adverse effects under section 106 may be mitigated, for example, the effect remains adverse.

The "Effects on Cultural Resources" section of this chapter (beginning on p. 192) includes an analysis, conclusion, and "section 106 summary" for each subtopic. The section 106 summary, which is intended to meet the requirements of section 106 of the National Historic Preservation Act, assesses the effects of the undertaking (implementing the alternative) on historic properties. This summary is based on the criterion of effect and criteria of adverse effect found in council's implementing regulations.

METHODS OF ASSESSING EFFECTS ON VISITOR UNDERSTANDING AND RECREATIONAL RESOURCES

The visitor experience in Coronado National Memorial encompasses a spectrum of elements, including access to recreational opportunities, the availability of such opportunities, and access to interpretation and orientation programs. For each alternative, three aspects of the visitor experience were evaluated: access to resources, interpretation and orientation, and visitor numbers and recreation. Every visitor to the national memorial brings unique expectations; thus, each visitor has a unique experience. The ways in which the actions and management prescriptions of each alternative might alter the quality of the visitor experience were considered.

Developing a quantitative analysis of the potential effects on the visitor experience is not feasible because the plan is prescriptive. In the qualitative analysis, professional judgment was used to reach reasonable conclusions as to the intensity and duration of potential impacts.

The following assumptions were used in the analysis:

- Visitor demand would be the same in all the alternatives.
- There would be no fundamental change in visitor access by private vehicle to the national memorial.

For access to resources, interpretation, and orientation, the impact analysis was based on whether the actions and management prescriptions of each alternative would change the availability of the existing range of interpretation programs and orientation and information sources and services throughout the memorial.

The impact analysis for visitor numbers and recreation was based on whether an alternative would result in a complete loss of recreational opportunity, a change in access to or availability of a recreational opportunity, or a change in the aggregate of recreational opportunities for visitors. This assessment is specifically concerned with whether the

availability of some aspect of visitor use would be altered. The change in the characteristics or quality of the experience was not considered in determining the intensity of an impact.

Context — Local effects would be those confined to Coronado National Memorial and Cochise County. Regional effects would extend beyond this geographic region to other counties or across the Mexican border to the south.

Intensity — The intensity of effects on the visitor experience and recreational resources has been evaluated as follows:

Negligible: The effect would be barely detectable, would not occur in primary resource areas, or would affect few visitors.

Minor: The effect would be slight but detectable, would not occur in primary resource areas, or would affect few visitors.

Moderate: The effect would be readily apparent, would occur in primary resource areas, or would affect many visitors.

Major: The effect would be severely adverse or exceptionally beneficial, would occur in primary resource areas, or would affect the majority of visitors.

Type —Beneficial effects would consist of greater access to or availability of a recreational experience or an opportunity for interpretation or orientation programs. Adverse effects would involve less availability of recreational resources or fewer opportunities for interpretation or orientation programs.

Duration — A short-term effect on visitor services, the visitor experience, or recreation would be temporary and associated with transitional types of effects such as dust generation during facility construction. A long-term effect would last longer and might permanently affect the visitor experience.

METHODS OF ASSESSING EFFECTS ON THE SOCIOECONOMIC ENVIRONMENT

The effects of the alternatives on the local and regional economy were analyzed. Quantitative analysis of potential effects on the socioeconomic environment was not feasible because the plan is prescriptive. Therefore, the analysis of effects was qualitative, and professional judgment was used to reach reasonable conclusions as to the context, intensity, type, and duration of potential impacts.

Context — The context of the analysis is local and regional, covering the national memorial, Cochise County, and the communities within the county. It is not expected that socioeconomic impacts would extend in Arizona beyond Cochise County or across the border into Mexico.

Intensity — The intensity of socioeconomic effects has been evaluated as follows:

Negligible: The action would not have an effect on the socioeconomic environment that would be distinguishable from changes that were occurring from other social and economic activities within the county and its communities.

For grazing, the effects of the action could not be distinguished from effects on the number of cattle raised locally associated with factors such as season, climate, or market prices. For the socioeconomic effects of recreation use, the effects of the action could not be distinguished from effects resulting from factors such as the price of gasoline, the exchange rates between dollars and

pesos, and the occurrence of a national expansion or recession.

Minor: The effect on socioeconomic conditions would be small but measurable in nearby communities such as Palominas, Hereford, and Bisbee. They would not be distinguishable from changes that were occurring from other social and economic activities in larger or more distant towns (such as Sierra Vista and Douglas) or on a county-wide basis.

For grazing, a change in the number of cattle raised locally could be discerned from changes caused by other factors, but a county-wide change could not be detected.

For the socioeconomic effects of recreation use, the effects of the action in small, nearby communities could be discerned from those resulting from broad economic influences, but such changes could not be established on a county-wide basis.

Moderate: The effect on socioeconomic conditions would be readily apparent and widespread in nearby, small communities. Changes would be detectable in larger cities such as Sierra Vista and Douglas, and throughout Cochise County. County-wide changes in cattle production could be detected. It could be established that county-wide socioeconomic effects from changes in recreation use were attributable to management actions in the monument.

Major: Major effects on socioeconomic conditions would be readily apparent and would substantially change the economy or social services in Cochise County.

Type — A beneficial socioeconomic effect would increase economic activity or improve social services or conditions in the affected area. Adverse socioeconomic effects would decrease economic activity or cause social services or conditions in the affected area to deteriorate.

Duration — A short-term socioeconomic effect would be temporary, and often it would be related to a specific action such as construction. It would not extend for more than a month or two beyond the completion of that action. Any socioeconomic effect that would extend for more than a year would be a long-term effect.

EFFECTS ON NATURAL RESOURCES

ALTERNATIVE A

Air Quality

Analysis. Alternative A probably would not result in any change in air quality at the memorial. There would be few or no changes to visitor facilities, and no roads or trails would be constructed. No construction equipment would be present in the memorial, and no fugitive dust would be generated. Visitation would continue to increase at the current rates. Under these circumstances, there would be no measurable effects on air quality. The memorial would continue to attain the prescribed air quality.

Cumulative Effects. The implementation of other projects and plans at the national memorial would not adversely affect air quality. Regionally, the population of Cochise County increased by just over 20 percent from 1990 to 2000. The memorial's air quality would be more likely to be affected by local population growth and development and by wind-borne pollution from distant sources than by management activities in the memorial. The no action alternative would not contribute to regional effects on air quality.

Conclusion. Alternative A would result in no measurable effects on the air quality at Coronado National Memorial.

Cave Resources

Analysis. There are a number of caves in the national memorial, with Coronado Cave being the most prominent and accessible (0.75 mile from the visitor center). This has resulted in a visitation, by permit, of between 5% and 6% of the people that currently come to the memorial. The cave contains various limestone formations (stalactites, stalagmites, flowstone, and helicites) and provides habitat for animals. Occasionally visitors might cause slight damage to cave resources. In any one year, the damage results in negligible to minor adverse effects on cave resources. However, the loss of resources year after year could eventually result in minor long-term adverse effects on cave resources.

Cumulative Effects. The opening of Kartchner Caverns State Park about 35 miles north of the memorial has increased the interest of the visitors in caves. This interest added to the accessibility of Coronado Cave has resulted in a slight increase in visitation to the memorial's cave. This increased interest in caves has resulted in a slight loss of sensitive cave resources in the area of Cochise County.

Conclusion. Cave resources would continue to be impacted by visitors and time with the result of a long-term minor adverse effect.

Soils

Analysis. Removing the Montezuma Ranch structures would affect Gardencan-Larque complex soils, which are associated with shallow hills and sandy-loam uplands. The area affected would be about 25 acres, or less than 1% of the national memorial's grassland habitat. The slope of these soils is low, ranging from 0% to 10%, and the erosion potential in this area is low. Local impacts on soils from removing the structures would be short term and negligible to minor because mitigative measures would be used to minimize erosion and to limit construction activities to the immediate area. Furthermore, the area would be revegetated.

Removing nonnative species and restoring and revegetating the area after the structures were removed would reduce soil compaction and increase permeability, improving soil properties. This would hold soils in place and reduce wind erosion. These long-term

beneficial effects would be negligible to minor.

Livestock grazing has been shown to affect soil structure and function, including soil porosity, chemistry, microbiology, nutrient cycles, productivity, and erosion rates (Roberson 1996). The gravelly, sandy-loam soils in the grazing allotments are subject to erosion caused by the loss of vegetative cover or the occurrence of infrequent torrential rains. Retaining the current levels of grazing would result in cattle hooves continuing to disturb cryptobiotic crusts (soil organisms that bind the soils and prevent soil loss), subjecting soils to wind and water erosion. Soils would continue to be susceptible to erosion when loosened by trampling or by the removal of vegetation (which stabilizes soils).

Erosion potentials are high on approximately 60% of the Joe's Spring allotment, where slopes exceed 30% (NRCS, USDA 2000). The steep slopes present in the Joe's Spring allotment however limits grazing in these areas. A positive correlation between slope and range condition has been noted in the Joe's Spring allotment, indicating that areas on lower slopes are more heavily grazed than steeper areas. Livestock use is concentrated on the lower slopes in the southern third of this allotment. This area has slopes that range from 0 to 10% with erosion factors ranging up to 0.32, indicating a medium level of susceptibility to sheet or rill erosion by water (NRCS, USDA 2000). Erosion problems such as soil compaction and soil loss have developed during more than 50 years of continuous grazing. Although there have been no livestock in the Montezuma allotment for several years, in this no-action alternative the possibility exists that the allotment might be used for grazing in the future. Accelerated erosion (as compared with most of the allotment) could occur on the relatively small parts of the Montezuma allotment that exceed a 20% slope.

With continued grazing soil compaction would occur. Evidence indicates that areas in the Joe's Spring allotment have become compacted with use (D. Robinett, Natural Resource Conservation Service, pers. comm.). This is particularly evident in the southeastern corner of the allotment where the cattle tend to congregate and in areas where they water. The Montezuma allotment, which has not been grazed since 1990, may be put back into use for livestock grazing at any time. In contrast to current conditions, the effects on soils from livestock use of this allotment would be clearly detectable. Increased soil compaction caused by livestock in those areas where they congregate, such as near water sources, would reduce soil fertility, which would lead to reduced plant productivity and changes in plant composition.

Implementing the *Livestock Management Plan* (NPS 2000b) is reducing the impacts on soils from grazing. Management activities such as reducing grazing intensity, shortening the season of use, limiting the use of riparian areas, controlling water sources, and using salt blocks are helping to mitigate impacts and protect soils. In addition, grazing management in the national memorial is now based on an adaptive management approach. A monitoring program developed to assess the condition of resources in the grazing allotments is used to adjust livestock numbers to protect resources. The adverse impacts on soils in these allotments that would result from grazing under the no-action alternative would be minor and long term.

Cumulative Effects. Because the national memorial is on a smuggling route for undocumented people and illegal drugs, such use has resulted in the creation of many footpaths, especially along drainages. The construction of a fence by the U.S. Border Patrol at the United States–Mexican border might funnel foot traffic westward into the memorial, which would create more footpaths, degrading soils and vegetation. In addition, soils in the memorial would be affected to a negligible degree by visitor use of trails and picnic areas. Soil compaction and erosion would occur along existing trails and by the

creation of social trails. Similar effects result from the development of game trails by wildlife in the area. These activities, along with the activities associated with the no-action alternative, would result in minor adverse impacts on soils throughout the national memorial.

Conclusion. No expansion would be planned for the visitor center vicinity. Off-road parking (mainly during peak periods) and social trails would continue to compact soils.

Removing the Montezuma Ranch structures would result in negligible to minor short-term local adverse impacts on soils. Mitigating measures would be employed to avoid or reduce effects. Restoration of this site would offset any adverse effects and result in up to minor long-term benefits.

The effects on soils from continued grazing on the allotments would be reduced through an adaptive management approach that would monitor impacts on soils and vegetation and adjust the number of livestock accordingly. Erosion and compaction caused by continuing grazing on both allotments would result in minor adverse impacts on soils.

Vegetation

Analysis. Removing the Montezuma Ranch structures would affect grama grass-mixed grass-mixed shrub vegetation types by trampling, uprooting, and crushing vegetation. Removing the structures would expose soils to wind and rain erosion with the potential to adversely affect riparian areas. The ranch area is adjacent to drainages that contain riparian vegetation of the western honey mesquite-mixed short tree woodland association. The area of potential affect is about 25 acres. The slope of the soils is this area is low, ranging from 0% to 10%, with a low erosion potential. Local impacts on vegetation from removing the structures would be short term and negligible to minor because mitigative measures would be used to minimize erosion and to limit construction activities to the immediate area.

In addition, the area would be restored with native plant species. Restoring and revegetating the ranch area after the structures were removed would reduce compaction and wind erosion and increase soil permeability. It also would restore the overall integrity of the vegetative community. These long-term beneficial effects would be negligible to minor.

Vegetation within the grazing allotments consists predominantly of grasses; however riparian vegetation of honey mesquite-mixed short tree woodland is supported along the drainages. The most common vegetative communities in the grazing allotments are oak-Mexican piñon-juniper association and grama species mixed grass-mixed shrub association. Nonnative and cool season grasses have replaced native warm season grasses in some parts of the allotments; this would continue (D. Robinett, Natural Resource Conservation Service, pers. com.). Even though grazing would continue in both allotments under this no-action alternative, the impacts from grazing on vegetation and in riparian areas is being reduced by the recent implementation of the *Livestock Management Plan* (NPS 2000b). Some of the measures that are reducing the effects of grazing include reducing grazing intensity, shortening the season of use, controlling water sources, and placing salt blocks away from riparian zones. Improvements will continue as these measures allow the riparian community to recover from past stresses associated with grazing. Reducing stocking levels and modifying the season of use is allowing native grass species to increase, which in turn is improving the range condition ratings in the allotments.

Modifying the season of use is helping to protect important areas of agaves during the growing season, increasing survival and improving the vegetation condition over time. (Cattle grazing on agave plants is of concern because the plants are important food for

nectarivorous bat species and for native herbivores, including pregnant white-tailed deer [Hawks, 1997].) The long-term beneficial effects on vegetation from implementing the actions of the *Livestock Management Plan* (NPS 2000b) are expected to be negligible to minor.

Monitoring has already started to improve the protection of vegetation. Modifying the grazing schedule during drought and after fire are maintaining and improving vegetative conditions. The cover and density of plants, especially warm season grasses, are expected to increase measurably after several years of *Livestock Management Plan* implementation. Bock et al. (1984) found that grass cover in an area excluded from grazing was substantially higher than in grazed areas. Brady et al. (1989) found no difference in plant cover within grazing exclosures but reported significantly higher cover of tall grasses such as plains lovegrass.

Although improvements to vegetation and range condition on the allotments will continue to occur, alternative A would continue grazing in the memorial resulting in a minor adverse effect on vegetative communities including riparian areas compared to alternatives that involve eliminating the grazing allotments. The diversity and cover of palatable grasses could change, with the species composition and overall abundance of vegetation cover being determined by the livestock management practices that are implemented. If management actions are loosely enforced, the abundance of palatable herbaceous species could decrease, and the distribution and abundance of woody shrub species and less palatable grasses and forbs could increase. The converse could occur with more aggressive livestock management according to the plan provisions. The speed of vegetative improvements would primarily depend on the grazing intensity that is permitted and the natural cycle of precipitation. Recovery would increase with lower livestock grazing intensity and more rain during the growing season.

Cumulative Effects. The footpaths along drainages resulting from the smuggling route for undocumented people and illegal drugs, along with the creation of more footpaths resulting from the construction of a fence by the U.S. Border Patrol, could degrade vegetation. This, along with the actions of the no-action alternative, would result in minor adverse impacts on vegetation throughout the memorial.

In June 1988 Coronado National Memorial was affected by the Peak Fire. In the memorial, the oak-Mexican piñon pine-juniper woodland association was most affected by the fast-moving, intense fire in continuous grass fuels because about 2,600 acres of the 3,700 acres that burned were in this habitat. Most of this biotic community was burned moderately, but some areas in the western part of the memorial were severely burned. However, by August 1989 many trees had resprouted either from the roots or from undamaged areas of the trunk.

The species composition of the woodland understory was significantly changed after the fire, probably because of the influx of nutrients or appropriate conditions for the germination of numerous herbaceous species that were either rare or absent before the fire. The grama grass-mixed grass-mixed shrub association was relatively unaffected by the fire because little fuel was present to sustain a high temperature. Consequently, the effect of the fire on this habitat was largely ephemeral because most of these species are fire-adapted and quickly resprout from roots. Under alternative A, vegetation would be disturbed, which would affect mainly grassland habitats; therefore, these disturbances would contribute little cumulatively to the past impacts of the 1988 wildfire.

Regionally, wildland fire is an increasing threat in scale and severity. Developing a fire management plan would reduce hazardous fuels in the memorial, diminishing the potential for wildland fire in the memorial and beyond its boundaries. A future fire

management plan, in combination with similar plans for Coronado National Forest and Fort Huachuca, would result in long-term minor benefits for vegetation in the region.

The encroachment of woody species into grasslands in the upper San Pedro Basin is a factor in regional decreases in the amount and ecological functioning of native grasslands and in their fragmentation into small, disconnected patches. Regional urban development also results in a loss of grassland acreage. Continuing grazing in the memorial would increase native shrubs, contributing to these cumulative adverse regional effects. Experimental investigation and treatments of Lehmann lovegrass are being conducted on Fort Huachuca. The no-action alternative would not contribute cumulatively to regional impacts on grasslands.

Conclusion. No expansion would be planned for the visitor center vicinity. Off-road parking (mainly during peak periods) and social trails would continue to impacts vegetation.

Removing the Montezuma Ranch structures would result in negligible to minor adverse short-term local impacts on vegetation. Mitigating measures would be used to avoid or reduce effects. Restoration and revegetation with native species would have a long-term negligible to minor beneficial effect.

The impacts on vegetation from continued grazing in the allotments is being reduced through an adaptive management approach that monitors the impacts on vegetation and adjusts the number of livestock accordingly. Minor adverse impacts on vegetation, including riparian vegetation, and range condition would result from erosion and compaction caused by continuing grazing on both allotments. However, modifying grazing management according to the *Livestock Management Plan* will improve range conditions compared to those that existed before the plan was implemented.

Threatened, Endangered, or Sensitive Species

Analysis. The Montezuma Ranch is about 2 miles from the roosting site of lesser long-nosed bats. Removing the ranch structures would have no effect on those roosting sites or on other abandoned mines in the memorial that are used for roosting sites by the Mexican long-tongued bat. Removing the structures might result in the loss of individual agave plants that are forage for the federally listed endangered lesser long-nosed and Mexican long-tongued bats and could displace small mammals that are prey to the loggerhead shrike (federally listed as a species of concern). Because the area disturbed would be small (about 25 acres) and the impacts from construction activity short-term and local, the adverse effects on the populations of either agaves or small mammals in the memorial would be negligible to minor. The effects on these listed or sensitive species from removing the ranch structures would be negligible.

The area that would be affected by removing the ranch structures (at a lower elevation on relatively level terrain vegetated largely with mixed grass and scrub) is outside the Mexican spotted owl's prime nesting and foraging habitat, which usually is found on slopes with gradients greater than 40 percent (USFWS 1995b). A survey of small mammals in the memorial (Swann et al. 2000) indicated a low availability of wood rats and peromyscid mice in the area of the ranch. Removing the structures would not be likely to adversely affect the Mexican spotted owl.

Restoring and revegetating the ranch might result in the establishment of more agave plants, which would benefit the nectar-feeding bats. Restoring the area also would increase the habitat available for small rodents and insects, which would result in negligible to minor beneficial effects on the loggerhead shrike.

Under alternative A, grazing would continue on both grazing allotments according to the

Livestock Management Plan (NPS 2000b). However, at present only the Joe's Spring allotment is being grazed. A mammal survey conducted in 1996–1997 indicated that the prey species of the Mexican spotted owl do not inhabit the grasslands of the Montezuma allotment. In the Joe's Spring allotment, the prey species are common in the grasslands but not common in the oak woodlands, which constitute about 29% of the vegetation. The prey species are common in the riparian areas of both allotments.

Because the grazing allotments lack suitable habitat for Mexican spotted owls, higher energy costs are necessary to reach the allotments, and the allotments have relatively low prey density and biomass, it is unlikely that the owls use the allotments. The National Park Service has determined, and the USFWS concurred that grazing under the *Livestock Management Plan* might affect but would not be likely to adversely affect Mexican spotted owls (Nov. 2, 2000).

The decline in agave plant populations throughout the range of the nectar-feeding bats has been cited as one of the reasons for federally listing the lesser long-nosed bat as endangered (USFWS 1994). Some studies found that cattle grazing is detrimental to agave, resulting in predation of flowering stalks and death of individual plants by trampling (Martinez-Morales and Meyer 1985; Hodgson and DeLamater 1988). However, in subsequent studies in Coronado National Memorial, Hawk (1997) found no significant differences in agave populations or flower stalk predation between grazed and ungrazed area. Instead, she found that high flower stalk predation occurred in all plots, and that native herbivores, including white-tailed deer, ate most of the flower stalks in areas where cattle were absent. Based on these findings, continued grazing in the memorial under alternative A would result in negligible effects on nectar-feeding bats. Alternative A would not be likely to adversely affect the lesser long-nosed bat.

Continuing grazing in the memorial would cause minor effects on wildlife species such as rodents, reptiles, small birds, and insects that are prey for the loggerhead shrike (also see "Wildlife," p. 143). Although grazing probably would not directly eliminate wildlife species, the population densities of some species might decline, and other generalist species could increase. Grazing probably would not change the overall availability of prey for loggerhead shrikes. Continuing grazing in the memorial might alter loggerhead shrike food sources, resulting in negligible direct and indirect adverse effects.

Cumulative Effects. A loss of trees in the memorial since 1978 and the resultant growth of high-elevation grasses since the wildfire of 1988 have resulted in an increase in rodent species and their predators (Ruffner and Johnson 1991). Continuing this trend would increase the prey availability of the loggerhead shrike, a minor beneficial effect for this species.

Forest vegetation provides habitat for species that require large areas of suitable forest cover and structure to maintain viable populations, most notably the threatened Mexican spotted owl. Wildfire is the primary threat to this species. The loss of about 2,600 acres of oak-pine-juniper woodlands in the memorial during the 1988 wildfire reduced nesting and foraging habitat. Without an active fire management program, woody fuels continue to accumulate in the memorial, increasing the potential for future wildland fire, which threatens the spotted owl habitat in the memorial and on adjacent lands. If there should be a catastrophic wildfire in the future that could not be suppressed, combined with previous adverse effects from fire on the owl habitat in the memorial, the impacts from wildfire would represent a moderate to major threat to the Mexican spotted owl. Actions to reduce hazardous fuel loads in Coronado National Forest that would be identified in a future fire management plan and that are now underway on Fort Huachuca would

cumulatively benefit the owl through reduced potential for habitat alteration.

The restoration of the grassland at Fort Huachuca would improve the ecological integrity and function of native grasslands and might increase the number agave plants, which would benefit nectar-feeding bats in the region. However, development in adjacent areas would continue to reduce grasslands, which could adversely affect agave populations. Implementing the *Livestock Management Plan* (NPS 2000b) is expected to result in an incremental increase in grassland and agave populations, which would locally benefit the national memorial but would not measurably affect the region.

Fort Huachuca and Coronado National Forest have developed plans to prevent the introduction of nonnative species, control the spread of others, and protect agaves on their lands. These efforts would increase the number of agave plants in the region, a minor to moderate benefit for the region's nectar-feeding bats. However, increasing development and continued grazing in adjacent areas would offset these benefits.

The effects that would result from alternative A, combined with the effects from other activities in the region, would result in cumulative adverse effects on critical habitat and on threatened, endangered, and special status species ranging from moderate to major. Implementing alternative A would contribute negligibly to the overall cumulative effect.

Conclusion. Current maintenance and operations activities would continue to have a negligible impact on wildlife.

Removing the Montezuma Ranch structures would disturb a small area, and the effects would be short-term and local, causing negligible to minor adverse effects on the populations of either agaves that are a food source for nectar-feeding bats or small mammals that are prey for the loggerhead shrike. The adverse effects to listed species would be negligible. The ranch area is not in prime foraging or nesting habitat for the Mexican spotted owl, and there is low availability of the owl's prey species in this location; therefore, removing the ranch structures would not adversely affect these owls.

Restoring and revegetating the ranch area might result in more agave plants, increasing the available food for nectar-feeding bats. Revegetating the area probably would increase the habitat and prey species of the loggerhead shrikes. Thus, there would be beneficial effects on the lesser long-nosed bat, the Mexican long-tongued bat, and the loggerhead shrike, and the restoration would not be likely to adversely affect these species. Because of the small portion of the national memorial affected, this alternative might affect the lesser long-nosed and Mexican long-tongued bat and the loggerhead shrike but would not be likely to adversely affect these species.

It is unlikely that Mexican spotted owls use the grazing allotments. Continued grazing in the memorial under alternative A, with the use of the *Livestock Management Plan,* would not be likely to adversely affect this species.

Alternative A also would not be likely to adversely affect the endangered lesser long-nosed bat.

Livestock grazing in the memorial under alternative A might adversely affect the loggerhead shrike by adversely affecting prey habitat for species that the loggerhead shrike relies on. These effects would be negligible.

Water Quality

Analysis. Removing the structures of the Montezuma Ranch (which is near a drainage but not directly adjacent to it) would expose soils to wind and rain erosion, and these soils could be deposited in the nearby drainage.

Because the soils are compacted, the slope of the area is low (0%–10%), and best management practices would be used to control erosion and site restoration, the short-term adverse effect on water quality from removing the structures would be negligible.

Restoring and revegetating the ranch area after the structures were removed would take place some distance from the riparian area, so the beneficial effects on water quality would be negligible, even though soil compaction would be reduced and permeability increased. Wind erosion would be reduced by the development of root systems through revegetation; this could benefit water quality.

Reducing the grazing intensity and shortening the season of use is improving watershed conditions by increasing vegetative cover along stream corridors. These practices also improve water quality by decreasing sedimentation, fecal coliform, and other microbes. However, grazing, even at reduced levels, would continue to degrade watersheds, causing soil erosion, reduced plant cover, and altered plant communities. The long-term adverse effects on water quality from continued grazing would be minor.

Cumulative Effects. Recreation, cattle grazing, ranching, road construction, water diversion, and urban development in the region all cumulatively affect soils, vegetation, and riparian environments, and consequently water quality.

Livestock grazing in riparian areas in upland communities would continue to affect water quality downstream on a reduced basis by reducing water infiltration and increasing runoff, erosion, sedimentation, and turbidity. The compaction of soils in grazed areas would continue to lead to reduced water infiltration and increased runoff, erosion, and sediment delivery to streams.

Continued grazing in the national memorial would contribute cumulatively to adverse effects on water quality. However, with the *Livestock Management Plan* in use, the effects of grazing in the memorial would be minimal in relation to other development and agricultural activities in the area. The effects on soils, vegetation, and riparian habitat in the memorial resulting from the actions of alternative A would add little to the regional cumulative effects on water quality compared to the disturbance occurring in other parts of the region.

Both allotments in the national memorial drain into the San Pedro River in either the United States or Mexico. The Arizona Department of Environmental Quality monitors water quality in the San Pedro River at a station approximately 9 miles east of the memorial and less than 4 miles north of the international boundary. The Environmental Protection Agency has classified portions of the San Pedro River between the Mexico border and Charleston Arizona as impaired under section 303d of the Clean Water Act because of turbidity levels that exceed water quality standards (AZ Dept. of Env. Qual. 1998). Over five years, 10%–25% of the samples taken exceeded the turbidity standard for the designated uses of aquatic life, wildlife, full body contact, and agriculture irrigation/ livestock water. However, the sources have been attributed to natural processes and grazing outside Arizona's jurisdiction.

The paths that have been created near the smuggling route for undocumented aliens and illegal drugs would continue to adversely affect riparian habitats through trampling of vegetation and increased erosion. This, coupled with the adverse impacts from grazing, would continue under alternative A, cumulatively affecting riparian habitat and consequently water quality.

Conclusion. Current memorial maintenance and operation actions would continue to result in a gradual, long-term beneficial impact on the memorial's water quality.

Removing the Montezuma Ranch structures would not measurably affect water quality because the action would not be near drainages, and mitigative measures would be used to contain or reduce soil erosion. Restoration of the site would offset any adverse effects of the removal.

Reducing livestock numbers consistent with the *Livestock Management Plan* is improving water quality by reducing sedimentation, fecal coliform, and other microbes, but grazing, even at reduced levels, would continue to degrade watersheds, This would cause soil erosion, decrease plant cover, and alter plant communities. The long-term adverse effects on water quality from continued grazing would be minor.

Wildlife

Analysis. Under alternative A, allowing the ranch structures to deteriorate would have no effect on wildlife species in the memorial. If the structures are removed, the activities associated with structural removal, such as the use of large trucks and the potential for ground disturbance, could adversely affect wildlife species in that location. Mobile animals would move to similar habitat during removal, but slow or sedentary animals might be lost. There would be negligible effects on common or highly mobile animal species (such as rabbit and deer) from the removal; however, the effects from removing the structures would be greater on populations of slow or sedentary rare or uncommon species known to have occupied the ranch area.

A 1998 survey found the secretive underground-dwelling desert shrew, uncommon in the memorial. Uncommon species of amphibians and reptiles occurring in the ranch area (barred tiger salamander, Madrean alligator lizard, short-horned lizard, prairie lizard, great plains skink, and blackneck garter snakes) also would be adversely affected by a loss of habitat or individuals, and individuals of rare or uncommon species might be lost from the memorial. With mitigative measures to reduce the adverse effects on these rare species, the overall short-term effect from removing the ranch structures would be negligible to minor. These activities would not be expected to result in any effect at the population or community level.

The adverse effects associated with the removal of structures at the ranch would be offset by restoration efforts that would restore natural wildlife habitat in the area. After structure removal, restoring the area to natural contours and revegetating it would improve grassland habitat, which would benefit wildlife species. An increase in rodent species in the memorial from 1978 was attributed to an increase in grasses and grass seed, which is favorable to small rodents. The increase in numbers and diversity of small rodents also has led to an increase in western diamondback rattlesnakes (Swann et al. 2000). Because only about 25 acres would be affected, the long-term beneficial effects on wildlife would be negligible.

The impacts on wildlife from cattle grazing are being reduced from pre-plan conditions by the recent implementation of the *Livestock Management Plan* (NPS 2000b). However, continued grazing in both allotments under this no-action alternative would continue to have adverse localized effects on wildlife, albeit at lower levels than occurred in the past. Compared to ungrazed conditions, ongoing effects from cattle grazing would include:

> Decreased availability of vegetation as a food source for wildlife as forage plants continued to be consumed by cattle.
>
> Changes in the composition of bird communities (Bock and Webb 1984, Bock et al. 1984). Ground-nesting birds would continue to be limited by the absence of suitable habitat because cover vegetation had been eaten or trampled by cattle.

Changes in the composition of lizard species (Bock, Smith, and Bock 1990).

Decreased productivity of grasshoppers (Jepson-Innes and Bock 1989), which are an important food source for many wildlife species.

Reduced plant cover would favor wildlife species adapted to open habitats. Although grazing probably would not directly eliminate wildlife species, population densities would be lower than those occurring in an ungrazed situation. Habitat generalists and species associated with disturbed or early seral conditions would be favored. The effect on wildlife communities from grazing under the no-action alternative would be minor, adverse, and long term.

Cumulative Effects. A fence built by the U.S. Border Patrol at the southern edge of Coronado National Memorial, newly installed lighting, and improvements to the dirt road there would have the potential to affect wildlife migration, access to water, and the movements of nocturnal species in local areas. Changes in the road would make travel at greater speeds possible, posing a threat to wildlife by collision. This project could adversely affect wildlife in the memorial, especially larger species adapted to moving over large tracts of land. Implementing alternative A would not contribute cumulatively to the adverse effects of the Border Patrol project.

Development, grazing, and loss of habitat in areas adjacent to the national memorial and in the San Pedro River valley might result in the loss of more wildlife species from the memorial, as has been documented for other western units of the national park system. The construction of roads in nearby areas would increase the number of accidental wildlife deaths and continue to fragment wildlife habitat. Timber harvesting in the adjacent Coronado National Forest would reduce available wildlife habitat. Hunting in the adjacent Coronado National Forest would remove small numbers of animals.

National parks have become vulnerable to poaching or collecting of valuable wildlife. Recent arrests of snake poachers in Arizona indicate that snakes are being collected in Chiricahua National Monument and Coronado National Memorial, but collecting in the national memorial appears to be infrequent and not to be affecting the memorial's reptile populations (Swann, Edwards, and Schwalbe 1999). The poaching of rare species, combined with the adverse effects of removing the Montezuma Ranch, would result in cumulatively adverse impacts on these populations in the memorial and regionally.

Conclusion. Removing the Montezuma Ranch structures and restoring and revegetating the area would result in more ground cover and habitat for small rodent species. The structure removal would cause short-term negligible adverse effects on wildlife. Mitigating measures would be used to prevent or reduce the effects on rare or uncommon wildlife species. Restoring and revegetating the site with native vegetation after the structures were removed would offset the adverse impacts on soils and improve grassland habitat, benefiting wildlife species.

Ongoing implementation of the *Livestock Management Plan* is improving wildlife habitat in the two allotments. However, continued grazing in the national memorial would result in minor long-term adverse impacts on some wildlife species from habitat loss and forage reduction.

Impairment

The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific

purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of resources or values related to air quality, cave resources, soils; vegetation; threatened, endangered, or sensitive species; water quality; or wildlife would result from implementing alternative A.

ALTERNATIVE B

Air Quality

Analysis. In alternative B, two kinds of action would adversely affect air quality:

(a) ground disturbance from restoration/revegetation efforts or from construction and road and trail improvements, either of which would result in wind-borne dust caused by the loosening of soils, which would produce occasional fugitive dust

(b) emissions produced by auto traffic and construction equipment

Vehicular emissions are transient, and no parameters in excess of established air quality criteria have been recorded in Cochise County. The increased visitation and the short-term presence of construction equipment that would occur under alternative B would not be likely to result in measurable changes to local air quality. Both the dust from ground disturbance and the emissions would result in negligible short-term transient effects on local air quality.

Cumulative Effects. Implementing projects and plans at the national memorial would not adversely affect air quality, which would be more likely to be affected by local development and pollution from distant sources than by the memorial's management activities. The construction activities and increased traffic of alternative B would contribute negligibly to transient local effects on air quality and would not affect regional air quality.

Conclusion. The construction activities and increased traffic from more visitation in alternative B would cause negligible local short-term adverse effects on local air quality at the memorial but would not affect regional air quality.

Cave Resources

Analysis. There are a number of caves in the national memorial, with Coronado Cave being the most prominent and accessible (0.75 mile from the visitor center). This has resulted in a visitation, by permit, of between 5% and 6% of the people that currently come to the memorial. The cave contains various limestone formations (stalactites, stalagmites, flowstone, and helicites) and provides habitat for animals. Occasionally visitors might cause slight damage to cave resources. In any one year, the damage results in negligible to minor adverse effects on cave resources. Developing a carrying capacity for Coronado Cave would result in the establishment of a monitoring system that would measure any loss of cave resources so that corrective measures could be taken. However, the loss of resources year after year could eventually result in minor long-term adverse effects on cave resources.

Cumulative Effects. The opening of Kartchner Caverns State Park about 35 miles north of the memorial has increased the interest of the visitors in caves. This interest added to the accessibility of Coronado Cave has resulted in a slight increase in visitation to the memorial's cave. This increased interest in caves has resulted in a slight loss of sensitive cave resources in the area of Cochise County.

Conclusion. There would be beneficial effects on Coronado Cave. The intensity of these effects would be difficult to quantify before the carrying capacity is determined, but

the effects would be long term and probably would be negligible to minor.

Soils

Analysis. Establishing a program to inventory, document, and interpret natural resources in the memorial would improve the memorial staff's ability to protect soil resources. Developing more interpretive materials and programs would help the public understand the memorial's resources of the memorial and the impacts associated with human activity. This understanding could facilitate NPS efforts to reduce visitors' effects on soil resources such as the creation of social trails or paths. Overall, a long-term negligible beneficial effect on soils could result from these programs.

Alternative B would involve ground disturbance for building an annex to the visitor center, adding parking, pullouts, and new trails and trailheads. The annex and parking area would be developed in a previously disturbed area where soil susceptibility to erosion is low. Construction activities associated with developing up to three new pullouts and waysides would result in the loss of soil through compaction and wind and water erosion. There would be short-term impacts on soils during construction. The long-term effects of these developments would be negligible to minor, considering the small size of the area affected, the low erosion potential of the areas, and the use of mitigative measures.

Adding new employee housing in the current residential area north of the visitor center could lead to a loss of soils from erosion and compaction. However, the area affected would be small (less than 1 acre). Soils that have been excavated and/or covered by impervious surfaces such as roads, parking lots, or buildings may lack typical physical, biological, and chemical properties. Therefore, the long-term adverse impacts of this development on soils would be negligible to minor, and mitigative measures would be used to minimize erosion and to limit construction activities to the immediate area.

Developing three trails in the grassland area north of the main road would disturb the Gardencan complex soils with erosion potentials ranging from low to moderate (see table 10, p. 90). The soils in the area that would be used for the accessible trail to be developed in the picnic area have a low erosion potential and moderate slopes. (Accessible trails must be at least 36 inches wide to accommodate wheelchairs and have turning areas of 60 inches wide every 200 feet.) The need to construct areas of the trail that would cross a drainage with a shallow slope for the creation of a ramp might necessitate routing the trail so that it would not rise or fall too steeply when crossing a drainage. This would reduce the impacts on soils. Where possible, the footprint of one of the existing trails or social trails would be used to develop the new accessible trail. Soil erosion would increase on and along the edges of these trails from visitor use. Development and visitor use of new trails would result in soil erosion and compaction, but the long-term effects would be negligible to minor because the locations have been previously disturbed, soil erosion potentials are low, and best management practices would minimize the impacts.

Removing the Montezuma Ranch structures under alternative B, reestablishing the natural contours, and revegetating the area with native species would result in effects on soils similar to those described for alternative A.

Restoring and revegetating East Forest Lane and the area where powerlines would be removed would benefit soils in the national memorial; that is, revegetation would improve soil properties by reducing soil compaction and increasing permeability. Revegetation also would result in the development of root systems, which would hold soils in place. The total area revegetated would directly affect less than 50 acres of soils. Restoring these sites

and Montezuma Ranch would result in long-term negligible to minor beneficial effects on soil resources.

Eliminating grazing from the national memorial would reduce some soil erosion and compaction and improve permeability. Furthermore, it would reduce the disturbance of soils and vegetation in the riparian areas and along dry streambeds in the allotments, which would reduce the amount of sediment being added to the stream channel. The beneficial effects on soils from eliminating grazing in the memorial would be long term and minor.

Cumulative Effects. The ground-disturbance associated with development under alternative B would affect less than 1% of the soils in the memorial. These adverse impacts would add cumulatively to the adverse impacts associated with illegal drug trafficking and immigration in the national memorial. Eliminating grazing on the allotments would result in a beneficial effect on 1,811 acres of soils in the national memorial. Restoring previously disturbed soils would offset any adverse effects associated with development.

Coronado National Memorial is on a smuggling route for undocumented people and illegal drugs. The illegal entry across the United States border into the memorial has resulted in soil compaction and erosion resulting from the development of numerous footpaths. In addition, soils in the memorial would be affected to a negligible degree by visitor use of trails and picnic areas. Visitor use results in soil compaction and erosion along existing trails and the creation of social trails that results in uprooting and damage to vegetation in the local area. These activities, along with the development of additional employee housing, would result in negligible to minor adverse impacts on soils and vegetation throughout the national memorial.

The efforts by the National Park Service to educate the public about the natural environment would support other local and regional entities' efforts to conserve and enhance the protection of natural resources in the area. Programs within the region including the memorial would enhance public awareness of the natural environment, which would benefit all natural resources.

Cochise County plans for increased growth in the Southern San Pedro Valley, with some restrictions on the scale and density of the development. Grazing occurs on private lands and in the Coronado National Forest adjacent to the national memorial. The beneficial effects on soils from alternative B would have little cumulative effect on a regional scale when compared to adverse effects offering to soils from increasing urban development and from agriculture in areas surrounding the national memorial.

Conclusion. Expanding the visitor center and adding parking, pullouts, and new trails and trailheads would affect less than 1 acre of soils, and mitigative measures would be used. These overall effects would be negligible to minor because of the small size of the area affected, the low erosion potential of the soils, and the implementation of mitigation measures.

Removing the Montezuma Ranch structures would erode and compact soils. The local adverse impacts on soils would be short-term and negligible to minor because mitigative measures would be employed to minimize erosion and limit construction activities to the immediate area. The adverse effects would be offset by beneficial effects from restoring and revegetating the site, which would improve the ecosystem's health and integrity by reducing nonnative vegetation and increasing the number of native species, a negligible to minor long-term beneficial effect. This alternative would reduce soil compaction and increase permeability and soil retention, a long-term negligible to minor beneficial effect on soil resources.

The development of new employee housing would result in long-term negligible to minor

adverse effects on soils, and mitigation measures would be employed to reduce erosion. Programs to interpret, document, and inventory memorial resources and uses would result in long-term negligible benefits to soils in the memorial.

Eliminating grazing from the memorial would result in long-term minor beneficial effects on soils by reducing nonnative species and reestablishing native vegetation. Overall, the beneficial effects of this alternative would offset any adverse impacts associated with development.

Vegetation

Analysis. Establishing a program to inventory, document, and interpret natural resources in the memorial would improve the memorial staff's ability to protect vegetation. Developing more interpretive materials and programs would help the public understand the memorial's resources of the memorial and the impacts associated with human activity. This understanding could facilitate NPS efforts to reduce visitors' effects on vegetative communities such as the creation of social trails. Overall, a long-term negligible beneficial effect on vegetation could result from these programs.

Less than 1 acre of oak-Mexican piñon-juniper woodland association would be disturbed by the construction of the visitor center annex and added parking; this association accounts for 3,363 acres of the memorial's vegetation. In the past, the vegetation in these areas has been fragmented and the integrity compromised on a small scale by the development of the visitor center and the picnic area. Therefore, these developments would result in long-term negligible to minor local adverse impacts, which would be mitigated by limiting maintenance activities to the immediate area and revegetating the areas after construction.

Expanding the pullout near the end of the main road to add a picnic area and wayside in part of the Montezuma Canyon drainage would disturb a small area of oak-Mexican piñon-juniper woodland association. The location of these pullouts has not been determined, but sensitive areas such as riparian habitat would be avoided. The amount of vegetation affected by these pullouts would be small in relation to the size of the memorial. Associated construction activities would result in a long-term loss of vegetation through trampling and uprooting. The overall effects of these developments and up to three new pullouts and waysides and would be negligible to minor because the affected areas would be small and mitigative measures would be used.

Adding new employee housing in the current residential area north of the visitor center could lead to a loss of vegetation from erosion and compaction as well as from the uprooting and loss of individual plants. However, the area affected would be small (less than 1 acre). Soils that have been excavated and/or covered by impervious surfaces such as roads, parking lots, or buildings may lack typical physical, biological, and chemical properties. Therefore, the long-term adverse impacts of this development on vegetation would be negligible to minor, and mitigative measures would be used to minimize erosion and to limit construction activities to the immediate area.

Developing four new trails and trailheads, some with restrooms, with three trails being in the grasslands, would affect less than 1% of the total grassland habitat in the national memorial, which constitutes 22% of the memorial's total vegetation. The grasslands have been disturbed in the past by grazing, and one trail would use the existing footprint of the Windmill Road. Developing an accessible trail in oak-Mexican piñon-juniper woodland association of the picnic area would affect less than 1% of this type of vegetation. Widening the trail to comply with accessibility requirements would necessitate removing vegetation and would compact more soils.

The widening and hardening of trails for accessibility would result in the compaction of soils and the loss of riparian vegetation where trails cross drainages. The local adverse effects of all trail development would be minor because the areas have been previously disturbed, and the effects throughout the memorial would be negligible because the affected area would be small.

Removing the Montezuma Ranch structures, reestablishing the natural contours, and revegetating the area with native species would result in effects on soils and vegetation similar to those described for alternative A.

Restoring and revegetating East Forest Lane, which crosses an ephemeral streambed, and removing powerlines along the Montezuma Pass road would affect vegetation in the mixed grasses and oak-Mexican piñon-juniper woodland and the honey mesquite–mixed short-tree woodland associations. Removing nonnative species and restoring native vegetation adjacent to a larger intact vegetative community would help to restore overall vegetative integrity and ecosystem health. Restoring these sites and Montezuma Ranch would affect less than 50 acres of vegetative habitat; therefore, the long-term beneficial effects would be negligible to minor.

Eliminating grazing from the national memorial might reduce the potential for nonnative species to invade and spread, which could occur by seeds being dispersed in fur and dung, by soils being disturbed (which creates conditions favorable to weedy species and reduces the potential for the establishment of native species) and by cattle consuming native species, reducing competition (Fleischner 1994). Ending grazing also might improve cover and the density of plants, especially warm season grasses. This would result in long-term minor beneficial effects on vegetation.

In addition, eliminating grazing from the memorial would result in a long-term gradual shift in forage plant species from a community dominated by less palatable species to one with predominantly palatable species. The availability of water would allow riparian areas in the grazing allotments to recover sooner than upland areas. Soil erosion in allotment areas would be reduced over time because of an increase in vegetation and plant litter. Noticeable improvements in range condition would take 25 to 50 years because soils and vegetation recover slowly in arid environments. The long-term beneficial effect on range condition from ending grazing in the memorial would be minor.

As described in the "Affected Environment" chapter, the studies of the effects of grazing on agave plants are conflicting. Two studies found that the trampling of young plants and eating of flowering stalks by cattle are detrimental to agave populations (Martinez-Morales and Meyer 1985; Hodgson and DeLemater 1988). However, a study conducted in the memorial found no difference between the allotment that continues to be grazed and the one that has not been grazed since 1990 (Hawks 1997). This was attributed to the predation of agaves by native herbivores, including white-tailed deer, in the ungrazed area. Bock et al. (1984) found that grass cover was substantially higher in an area excluded from grazing than in grazed areas. Brady et al. (1989) found no difference in plant cover within grazing exclosures, but reported significantly higher cover of tall grasses such as plains lovegrass.

Cumulative Effects. The encroachment of woody species throughout grasslands in the upper San Pedro Basin is a factor in regional decreases in the amount and ecological functioning of native grasslands and in their fragmentation into small, disconnected patches. Urban development in the region also has resulted in a loss of grassland acreage. Another regional issue is the intrusion of nonnative plant species. Fort Huachuca and Coronado National Forest are trying to prevent the introduction of such species and control their spread. Fort Huachuca is con-

ducting experimental investigation and treatments of Lehmann lovegrass. Ending grazing in the national memorial would benefit the grassland habitat, and restoring native species under alternative B would benefit vegetation. However, the actions of alternative B would not offset the loss of grasslands from development or the invasion of nonnative plants in the region, and implementing the alternative would contribute little cumulatively to regional effects.

Coronado National Memorial is on a smuggling route for undocumented people and illegal drugs. The illegal entry across the United States border into the memorial has resulted in soil compaction and erosion resulting from the development of numerous footpaths. In addition, vegetation in the memorial would be affected to a negligible degree by visitor use of trails and picnic areas. Visitor use results in soil compaction and erosion along existing trails and the creation of social trails, which results in uprooting and damage to vegetation in the local area. These activities, along with the development of additional employee housing, would result in negligible to minor adverse impacts on soils throughout the national memorial.

The efforts by the National Park Service to educate the public about the natural environment would support other local and regional entities' efforts to conserve and enhance the protection of natural resources in the area. Programs within the region including the memorial would enhance public awareness of the natural environment, which would benefit all natural resources.

Conclusion. Expanding the visitor center and adding parking, pullouts, and trailheads would affect less than 1 acre of vegetation, and mitigative measures would be used. The impacts would be negligible to minor because of the small size of the area affected, the low erosion potential of the soils, and the use of mitigation.

The development of new employee housing would result in long-term negligible to minor adverse effects on vegetation, and mitigation measures would be employed. Programs to interpret, document, and inventory memorial resources and uses would result in long-term negligible benefits to vegetation in the memorial.

Removing the Montezuma Ranch structures would result in local adverse impacts on vegetation, which would be short term and negligible to minor because mitigative measures would be used to minimize soil erosion, limit construction activities to the immediate area, and accelerate restoration of native plant species. The adverse effects would be offset by beneficial effects from restoring and revegetating the site, which would improve the ecosystem's health and integrity by reducing nonnative vegetation and increasing the number of native species, a negligible to minor long-term beneficial effect.

Ending grazing in the memorial would result in long-term minor beneficial effects on vegetative communities and range condition by reducing nonnative species and reestablishing native vegetation. Overall, the beneficial effects of this alternative would offset any adverse impacts associated with development.

Threatened, Endangered, or Sensitive Species

Analysis. The knowledge gained through establishing an inventory program would enable NPS personnel to better protect sensitive resources such as threatened and endangered species. Educating the public through new interpretive materials could help to reduce the adverse impacts on resources that sensitive species rely on. Overall, developing interpretive programs would result in a beneficial effect on threatened, endangered, or sensitive species.

Expanding the visitor center and adding hiking trails, parking lots, and pullouts would not directly affect federally listed or sensitive species in the memorial. The development-related activities of alternative B would not affect the roosting sites of lesser long-nosed bats or Mexican long-tongued bats. Those activities might indirectly affect listed or sensitive species by disturbing prey species and vegetation. With mitigation to transplant agaves in construction sites (to prevent the loss of important food sources for nectar-feeding bats), the development activities of alternative B would not be expected to alter the population of agave plants. Because the area disturbed would be minimal and construction activities would be short-term, there would be no measurable effect on small mammal populations in grassland habitats, which are the prey base of the loggerhead shrike. Therefore, implementing alternative B might indirectly affect the lesser long-nosed and Mexican long-tongued bat and the loggerhead shrike but would not be likely to adversely affect these species.

Developing trails in the grassland areas at lower elevations would be unlikely to affect Mexican spotted owls because these grasslands and scrub areas lack suitable habitat for nesting and have relatively low prey density and biomass. Expanding the visitor center parking lot, developing a new trail near the current picnic area, upgrading the interpretive trail near the visitor center, and developing new housing would take place in pine-oak-juniper forests that are potential foraging habitat for the owls. Developing and expanding recreational facilities in this area might alter the foraging habitat and the use of this habitat by the owl (USFWS 1995b). However, since these developments would take place in previously disturbed areas that are frequently used by visitors, it is likely that the owls avoid this area when foraging. The effects on owl foraging habitat outside protected activity centers from development would be short-term, indirect, and negligible, and the species would not be likely to be adversely affected.

Removing the Montezuma Ranch structures and restoring the area would result in long-term indirect minor beneficial effects on threatened, endangered, or sensitive species similar to those described for alternative A. Long-term indirect minor beneficial effects would result from increasing the prey habitat of the lesser long-nosed bat, the Mexican long-tongued bat, and the loggerhead shrike. The ranch area is not in prime owl foraging or nesting habitat; therefore, removing the ranch buildings would not adversely affect the Mexican spotted owl.

Restoring and revegetating East Forest Lane might increase loggerhead shrike habitat and the shrike's prey species (small mammals, insects, and reptiles), a long-term benefit for the shrike. Revegetating the road also might establish more agave plants, which would have a beneficial effect on the agave population and subsequently the nectar-feeding bats. However, the area involved would be only a small part of the memorial; therefore, these restoration activities would not be likely to adversely affect the lesser long-nosed or Mexican long-tongued bat or the loggerhead shrike; rather, they would cause negligible to minor beneficial effects.

Part of the powerline that parallels the road to Montezuma Pass is in the proposed protected activity center for Mexican spotted owls. The powerline to be removed and revegetated is in the pine-oak-juniper forest, which is foraging habitat for the owl. Removing the powerline could result in short-term indirect negligible effects resulting from human presence and activity, which probably would cause owls to avoid the area. Restricting the powerline removal activity in the protected activity center during the breeding season would mitigate these effects. However, revegetating the area would produce a negligible to minor benefit for the species by increasing habitat available for its prey species. Any short-term disturbance of the owls' foraging habitat

caused by removing the powerline would be offset by the benefits.

Eliminating grazing in the memorial might increase the prey base and nesting habitat for the loggerhead shrike. Bock et al. (1984) found a negative correlation between grazing and overall rodent densities in desert environments, and studies in the memorial have shown that increased grassland habitat resulted in increases in small mammal diversity and in their predators such as the western diamondback rattlesnake (Swann, Alberti, and Schwalbe 2001). Studies by Hawks (1997) in Coronado National Memorial showed that grazing had little effect on agave populations, or the predation of flower stalks of Palmer's agave, which are an important food source for nectar-eating bats. Therefore, eliminating grazing probably would have a negligible effect on the long-nosed bat.

Alternative B would not be likely to adversely affect the endangered lesser long-nosed bat.

Because the grazing allotments lack suitable habitat for Mexican spotted owls, higher energy costs are necessary to reach the allotments, and the allotments have relatively low prey density and biomass, it is unlikely that the owls use the allotments. Ending grazing in the memorial would not be likely to adversely affect Mexican spotted owls.

Cumulative Effects. Efforts by the National Park Service to educate the public about the natural environment would support other local and regional entities' efforts to conserve and enhance the protection of natural resources in the area. Natural areas adjacent to the memorial such as the national forests, the national conservation area, and state parks offer interpretive programs and provide visitor information related to the unique natural environment found in the region. These programs along with enhanced interpretation and inventorying of memorial resources that enhance public awareness and understanding of the natural environment would benefit all natural resources.

A loss of trees in the memorial and the resultant growth of high elevation grasses since the wildfires of 1988 have resulted in an increase in rodent species, which has increased the availability of prey for the loggerhead shrike, a minor beneficial effect for the shrikes and their prey. Eliminating grazing under alternative B would increase grassland habitat and small mammal habitat, which would increase the prey abundance for the shrike. Ending grazing in the memorial, combined with the effects of the past fire, would result in a minor cumulative benefit to the loggerhead shrike.

As has been mentioned, wildfire is the primary threat to the persistence and recovery of the Mexican spotted owl (USFWS 1995b). The loss of owl habitat in the memorial from the 1988 wildfire, together with the potential for future catastrophic fire, represents a moderate to major threat to this species. Limiting the removal of powerlines in the proposed protected activity center to a time not in the owl's breeding season would cause negligible effects on the species. This activity, combined with habitat loss from wildfire, would cause moderate to major effects on the Mexican spotted owl. Actions to reduce hazardous fuel loads in Coronado National Forest, which would be identified in a future fire management plan and are currently underway on Fort Huachuca, would cumulatively benefit the owls by reducing the likelihood of habitat alteration.

The restoration of grassland on Fort Huachuca is improving the ecological integrity and function of native grasslands. Prescribed burns on private and public lands are being used to maintain grasslands, which might increase the region's agave population, a minor to moderate benefit for nectar-feeding bats in the region. Alternative B would make a negligible contribution to these beneficial effects on grasslands and nectar-feeding bats. The overall beneficial cumulative effect on listed and sensitive bat species in the region would range up to moderate.

Conclusion. Programs to interpret, document, and inventory memorial resources and uses would result in a long-term negligible benefits to threatened and endangered or sensitive species in the memorial.

Enlarging the visitor center and adding trails, parking areas, and pullouts would cause indirect effects on lesser long-nosed bats, Mexican long-tongued bats, and loggerhead shrikes by disturbing vegetation and small mammals that are food sources for the shrikes. The developments would not measurably affect the population of agaves, a food source for the lesser long-nosed bat and the Mexican long-tongued bat, nor would it alter the populations of small mammals in grassland habitats, which are the prey base of loggerhead shrikes.

The development activity near the visitor center would occur in pine-oak-juniper forests that is primary foraging habitat of the Mexican spotted owl. These actions would take place in areas previously disturbed and frequently used by visitors. The owls often avoid those areas. The developments in owl foraging habitat outside the protected activity center would be short-term, indirect, and negligible and would not be not likely to adversely affect the species.

Removing the Montezuma Ranch structures would disturb about 25 acres (less than 1% of the memorial's acreage), causing negligible to minor adverse effects on the food base of the lesser long-nosed bat, the Mexican long-tongued bat, and the loggerhead shrike. Therefore, removing the structures might indirectly affect but would not be likely to adversely affect those listed or sensitive species. The ranch area is not in prime foraging or nesting habitat for the Mexican spotted owl, and there is low availability of the owl's prey species in this location; therefore, removing the ranch structures would not be likely to adversely affect this species.

Restoring and revegetating the ranch area after removing the structures might increase the number of agave plants, resulting in more available food for nectar-feeding bats. Revegetating the area probably would increase the habitat and prey species of the loggerhead shrikes. Thus, there would be beneficial effects on the lesser long-nosed and Mexican long-tongued bat and the loggerhead shrike, and the restoration would not be likely to adversely affect these species. Because only a small part the memorial would be affected, this alternative might affect the lesser long-nosed and Mexican long-tongued bats and the loggerhead shrike but would not be likely to adversely affect these species.

It is unlikely that Mexican spotted owls use the grazing allotments; therefore discontinuing grazing would likely not affect these owls.

Alternative B would not be likely to adversely affect the endangered lesser long-nosed bat.

Eliminating grazing from the memorial might increase the prey base and nesting habitat for loggerhead shrike. It would have a negligible effect on the lesser long-nosed and Mexican long-tongued bat.

Water Quality

Analysis. Better protection of soils and vegetation through a monitoring program would lead to better protection of water quality, an overall beneficial effect on water quality under this alternative. Developing new employee housing would not affect riparian habitat, and mitigative measures would include actions to minimize erosion by stabilization with structures or vegetation. Therefore, there would be no adverse impact on water quality from building new housing.

The short-term effects on water quality from constructing the visitor center annex and a new parking area would negligible because the construction would not be in riparian habitat,

and best management practices would be used to reduce soil erosion into the adjacent environment and to limit construction activity to the immediate area. Expansion of an existing pullout near the end of the park road would provide for a picnic area and wayside and would occur along a small portion of the Montezuma Canyon drainage. Two more pullouts would be developed to take advantage of park views, however the location of these is undetermined. The construction-related activities would result in increased soil erosion and a loss of vegetation in the riparian area. The area affected by pullout development would be small and mitigated by measures to limit erosion through structures or revegetation of the area. The short-term effects on water quality of these developments would be localized and negligible to minor and would lessen with the reestablishment of streambank vegetation after construction.

Developing four new trails, with one trail, including part of the old Windmill Road, widened and hardened for accessibility, would result in the compaction of soils, with a short-term increase in soil erosion and sedimentation into the streambed during construction. It also would cause a loss of riparian vegetation where trails cross drainages. Parts of two accessible trails would cross drainages and might need to be adjusted for slope requirements, which would reduce soil erosion in the riparian habitat. Because an existing footprint would be used for parts of the trails and mitigating measures would be used to prevent trampling and the loss of riparian vegetation, the adverse effects on water quality from trail development would be limited, since the areas disturbed would be small.

Removing the Montezuma Ranch structures under alternative B, reestablishing the natural contours, and revegetating the area with native species would result in effects on water quality similar to those described for alternative A.

Restoring natural contours and vegetation in areas now occupied by abandoned powerlines in the Montezuma Canyon drainage would increase soil erosion, subsequently increasing stream sedimentation and turbidity. This would cause the loss of some riparian vegetation, a short-term adverse effect that would be offset by revegetating these areas. The long-term effects on water quality would be negligible because the affected area would be small. In addition, best management practices would be used to control soil erosion.

Reclaiming East Forest Lane, which crosses a drainage along its course, would increase riparian vegetation and decrease soil erosion and sedimentation into the adjacent drainage. Revegetating riparian areas and closing this road would result in minor beneficial long-term effects on water quality.

Eliminating grazing from the national memorial would end the livestock disturbance of soils and vegetation in riparian areas along dry streambeds, reducing streambank erosion and the amount of sediment being added to the stream channel. The long-term beneficial effects on water quality in the memorial would be minor.

Cumulative Effects. Recreation, cattle grazing, ranching, road construction, water diversion, and urban development in the region all cumulatively affect soils, vegetation, and riparian environments, and consequently water quality. Developing additional employee housing in the memorial would not contribute to the cumulative effects of these other activities occurring in the region.

Erosion and pollution control measures at Fort Huachuca and Coronado National Forest would reduce potential water quality impacts in the San Pedro River basin. Implementing alternative B at Coronado National Memorial would reduce erosion, consequently reducing a potential source of sediment and turbidity in the San Pedro River channels. The actions of alternative B also

would support the goals of the Upper San Pedro Partnership to manage drainages in the Upper San Pedro River basin so as to decrease erosion from runoff, adding cumulatively to the beneficial effects on water quality from actions by other public agencies.

Conclusion. No adverse effects on water quality would be anticipated from developing additional employee housing. The establishment of monitoring programs in the memorial to monitor activities such as grazing would benefit overall water quality in the memorial.

Adding an annex to the visitor center and developing new parking and pullouts would affect less than 1 acre, resulting in long-term negligible to minor adverse impacts on water quality. Mitigative measures would be used to reduce soil erosion and the loss of vegetation along streams.

Removing the Montezuma Ranch structures and restoring and revegetating the area would have negligible effects on water quality.

Restoring East Forest Lane and the site where powerlines would be removed would restore native riparian vegetation, reducing soil erosion and sedimentation. The long-term beneficial effects on water quality from those activities would be negligible to minor.

Ending grazing in the memorial would improve water quality by decreasing sedimentation and reducing fecal coliform and other microbes, a long-term minor beneficial effect on riparian habitats and water quality. Overall, the beneficial effects on water quality from this alternative would offset any adverse impacts associated with development.

Wildlife

Analysis. Through knowledge gained from an inventory and monitoring program, national memorial staff could better protect wildlife habitat. Educating the public with interpretive materials could reduce impacts on wildlife and habitat from visitor use. Overall, developing interpretive programs would result in a beneficial effect on wildlife.

The effects on wildlife in the memorial from expanding the visitor center, new employee housing, and adding a pullout near the end of the paved main road would be negligible for mobile species, but slow or sedentary species, particularly amphibians and reptiles, would be more susceptible to adverse effects from construction. Individuals of these populations might be lost. However, with mitigation to reduce impacts on rare or uncommon species, the short-term adverse effects on wildlife from alternative B would be negligible to minor.

The effects of roads and trails on wildlife are diverse. These effects include mortality, restricted movement, introduction of exotic plants (which could affect wildlife habitat), habitat fragmentation and edge effect, and increased human access to wildlife habitats (Colorado State Parks 1998, Forman 2000, Forman and Alexander 1998). Trails and roads in the memorial bring people into wildlife habitat. People hiking or driving along roads disturb wildlife species, and wildlife sometimes react to the presence of people or the noise of or their machines with an increased expenditure of energy, which could lead to increased mortality. Escape responses to human disturbance can be energetically "expensive" to wildlife for two reasons: feeding animals stop eating when disturbed, and disturbed animals use energy to run or otherwise move away from the disturbance (Colorado State Parks 1998, Knight and Gutzwiller 1995).

Developing new trails in the grasslands where recreation activity has been minimal in the past might adversely affect some individual wildlife, family groups, or nesting colonies because of noise or passive disturbance by the presence of humans. Because survey data indicates a lack of rare or uncommon species and the area affected by trail development would affect a small portion of the wildlife

habitat available in the memorial, the impacts of trail use by visitors in these grassland areas would be negligible to minor. Some benefits to individual animals in the memorial might result from trail development. Animals such as mule deer and white-tailed deer might use the trails and roads to facilitate movement within the habitat. Ease of movement might benefit individuals of those species by reducing energy expenditures. The long-term benefits would likely be negligible.

Widening and paving Windmill Road to convert it to an accessible trail would result in negligible adverse effects on wildlife species. Developing an accessible trail in the picnic area would remove some wildlife habitat and displace of some species; however, the impact would be negligible because the area affected would be small.

Removing the Montezuma Ranch structures, reestablishing the natural contours, and revegetating the area with native species would result in effects on wildlife similar to those described for alternative A.

Restoring and revegetating East Forest Lane and removing the powerline along the main road would increase habitat and food for many species of small mammals, nesting birds, and reptiles, benefiting wildlife in the long term. Restoring the powerline area would improve oak woodland and riparian habitats, which would benefit rare and uncommon species such as Woodhouse's toad and the Sonoran Mountain king snake. East Forest Lane traverses many plant associations, grassland, oak woodland and riparian areas, so its restoration would benefit the prairie lizard, the big bend patchnose snake, and the Mojave rattlesnake. The areas restored would constitute only a small part of the national memorial; therefore, the long-term beneficial effects on wildlife would be negligible to minor.

Closing East Forest Lane to vehicles would decrease the potential for road kill and reduce the indirect effects of human presence, and revegetating the road would provide more continuous habitat for animal migration. The absence of the road would benefit larger animals in the memorial such as predators and deer. The wash draining the east slope of the memorial represents the best potential conduit for wildlife (Hass 2000); therefore, eliminating this road would result in a long-term negligible to minor beneficial effect on migrating species.

Eliminating grazing from the national memorial would reduce the impacts on soils and vegetation, benefiting some wildlife species by making more food and cover available. Ground cover would be increased, making more and better grassland available for bird nesting. The quality of habitat for most wildlife under alternative B would be better than under alternative A. Studies in the memorial have shown that more grassland habitat has led to an increase in small mammal diversity and in their predators, such as the western diamondback rattlesnake (Swann, Alberti, and Schwalbe 2001).

Ending grazing in the memorial might result in the loss of some species that prefer more open, desertlike habitat created by grazing. The coachwhip was the second most abundant snake species at Coronado in 1979 (Cockrum et al. 1979); however, in a recent survey, the species was found to be rare (Swann et al. 2000). The decline was attributed to a lack of grazing on the Montezuma allotment, which altered the habitat. The reduced impact on riparian vegetation would increase cover and nesting habitat, beneficially affecting species such as migrating birds, deer, and predators that use the drainages on the allotments as corridors. Overall, eliminating grazing under alternative B would result in minor long-term beneficial effects on wildlife.

Cumulative Effects. Grassland restoration in Fort Huachuca is being used to improve the ecological integrity and function of native grasslands, and prescribed burning on private and public lands in the area is used to maintain grasslands. The actions of alternative

B would contribute cumulatively to these regional beneficial effects on grasslands.

In combination with forest conservation actions in the isolated mountains of southeastern Arizona and in the San Pedro River National Conservation Area, the actions of alternative B would benefit both migratory birds and larger, dispersing animals that require more forest habitat to sustain viable populations. The Upper San Pedro Valley is a major neotropical migrant bird corridor. Woodlands and forest habitats in the Huachuca Mountains and in the San Pedro River National Conservation Area are important habitat resources for migrating birds.

Proposed management actions at Fort Huachuca and activities in the Coronado National Forest (such as snag and nest tree protection and wildfire management) would sustain biologically and structurally diverse habitat for migrating or dispersing wildlife in the Huachuca Mountains. The actions of alternative B would complement these efforts to maintain wildlife corridors and riparian areas and conserve native grasslands.

Developments by the border patrol to improve roads and install fencing and lighting adversely affect wildlife by impeding movement, altering feeding patterns, and reducing habitat quality for nesting and feeding. Development, grazing, and loss of habitat in areas adjacent to the national memorial and in the San Pedro River valley might result in the loss of more wildlife species from the memorial. Timber harvesting and hunting in the adjacent Coronado National Forest would reduce available wildlife habitat, alter animal behaviors, and results in the removal of individuals. Although thought to be rare in the memorial, poaching of reptiles and amphibians results in a loss of individuals and may reduce populations of rare or uncommon species in the region. Development within the national memorial including new employee housing which would result in the loss of a small portion of wildlife habitat would contribute negligibly to the adverse cumulative effects of these other regional activities.

The efforts by the National Park Service to educate the public about the natural environment would support other local and regional entities efforts to conserve and enhance the protection of natural resources in the area. Programs within the region including the memorial that enhance public awareness of the natural environment help to protect sensitive areas such as riparian areas. Protection of these areas conserve wildlife habitat and benefit wildlife within the region.

Conclusion. Programs to interpret, document, and inventory memorial resources and uses would result in a long-term negligible benefits on threatened and endangered or sensitive species in the memorial. Loss of a small portion of wildlife habitat and the potential for loss of sedentary individual animals from development of new employee housing would have long-term negligible to minor adverse effects.

Expanding the visitor center and building trails would result in more public access to wildlife habitat, resulting in negligible to minor adverse effects. Trails and roads might benefit some species by facilitating movement.

Removing the Montezuma Ranch structures, with mitigating measures to reduce impacts on rare or uncommon species, would result in long-term negligible adverse effects on wildlife. Restoring the ranch area to natural contours and revegetating it would improve grassland habitat, resulting in a long-term negligible to minor benefit for wildlife species. Ending grazing in the national memorial would improve habitat and forage, benefiting wildlife.

Impairment

The resources and values of Coronado National Memorial would not be impaired

because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of resources or values related to air quality; cave resources, soils; vegetation; threatened, endangered, or sensitive species; water quality; or wildlife would result from implementing alternative B.

ALTERNATIVE C

Air Quality

Analysis. Limited amounts of fugitive dust would be generated in alternative C by restoration and revegetation activities, upgrading the interpretive trail, and renovations at the visitor center. This would not affect visitors or staff to a notable degree. Visitation and traffic would continue to increase at current rates. The short-term adverse effects on air quality from these activities would be negligible and localized. Other plans and management activities of the national memorial would not adversely affect air quality.

Cumulative Effects. Population growth and development outside the national memorial would be more likely to affect air quality than the management activities of the memorial. In addition, emissions from Tucson and Mexico are carried to the memorial by prevailing winds. Alternative C, in conjunction with other actions, would contribute negligibly to short-term local adverse effects on air quality but would not affect regional air quality.

Conclusion. The construction activities and increased traffic from more visitation in alternative C would cause negligible local short-term adverse effects on local air quality at the memorial but would not affect regional air quality.

Cave Resources

Analysis. There are a number of caves in the national memorial, with Coronado Cave being the most prominent and accessible (0.75 mile from the visitor center). This has resulted in a visitation, by permit, of between 5% and 6% of the people that currently come to the memorial. The cave contains various limestone formations (stalactites, stalagmites, flowstone, and helicites) and provides habitat for animals. Occasionally visitors might cause slight damage to cave resources. In any one year, the damage results in negligible to minor adverse effects on cave resources. Developing a carrying capacity for Coronado Cave would result in the establishment of a monitoring system that would measure any loss of cave resources so that corrective measures could be taken. However, the loss of resources year after year could eventually result in minor long-term adverse effects on cave resources.

Cumulative Effects. The opening of Kartchner Caverns State Park about 35 miles north of the memorial has increased the interest of the visitors in caves. This interest added to the accessibility of Coronado Cave has resulted in a slight increase in visitation to the memorial's cave. This increased interest in caves has resulted in a slight loss of sensitive cave resources in the area of Cochise County.

Conclusion. There would be beneficial effects on Coronado Cave. The intensity of these effects would be difficult to quantify before the carrying capacity is determined, but the effects would be long term and probably would be negligible to minor.

Soils

Analysis. Establishing a program to inventory, document, and interpret natural resources in the memorial would improve the memorial staff's ability to protect soil resources.

Developing more interpretive materials and programs would help the public understand the memorial's resources of the memorial and the impacts associated with human activity. This understanding could facilitate NPS efforts to reduce visitors' effects on soil resources such as the creation of social trails or paths. Overall, a long-term negligible beneficial effect on soils could result from these programs.

Adding parking spaces for four buses or recreational vehicles in the picnic area would result in long-term negligible to minor impacts on soils in a previously disturbed area where the soils have a low susceptibility to erosion (see table 10, p. 90). Best management practices would be used to reduce or eliminate impacts.

Adding new employee housing in the current residential area north of the visitor center could lead to a loss of soils from erosion and compaction. However, the area affected would be small (less than 1 acre). Soils that have been excavated and/or covered by impervious surfaces such as roads, parking lots, or buildings may lack typical physical, biological, and chemical properties. Therefore, the long-term adverse impacts of this development on soils would be negligible to minor, and mitigative measures would be used to minimize erosion and to limit construction activities to the immediate area.

Widening the interpretive trail and compacting soils to create a hardened surface for better accessibility would affect local soils. The long-term effects would be negligible to minor because the area affected would be small and the existing trail footprint would be used.

Removing the Montezuma Ranch structures, reestablishing the natural contours, and revegetating the area with native species under alternative C would result in effects on soils similar to those described for alternative A.

Reestablishing and restoring natural contours and vegetation in areas now occupied by abandoned powerlines, roads, the Montezuma Ranch structures, the former fiesta grounds, the dirt storage area, and social trails and nonhistoric structures would affect about 50 acres. Restoring and revegetating these sites would improve soil properties by reducing soil compaction and increasing permeability, and it would restore overall vegetative integrity and ecosystem health. Such restoration would result in larger areas of unbroken habitat for wildlife, the removal of nonnative species, and the development of root systems that would hold soils in place. The local long-term beneficial effects on soils would be negligible to minor.

Eliminating grazing from the national memorial under alternative C would result in effects on soils similar to those described for alternative B.

Cumulative Effects. The ground-disturbance associated with development under alternative C, similar to alternative B, would affect less than 1% of the soils in the memorial. These adverse impacts would add cumulatively to the adverse impacts associated with illegal drug trafficking and immigration in the national memorial. Eliminating grazing on the allotments would result in a beneficial effect on 1,811 acres of soils in the national memorial. Restoring previously disturbed soils would offset any adverse effects associated with development.

Coronado National Memorial is on a smuggling route for undocumented people and illegal drugs. The illegal entry across the United States border into the memorial has resulted in soil compaction and erosion resulting from the development of numerous footpaths. In addition, soils in the memorial would be affected to a negligible degree by visitor use of trails and picnic areas. Visitor use results in soil compaction and erosion along existing trails and the creation of social trails that results in uprooting and damage to vegetation in the local area. These activities,

along with the development of additional employee housing, would result in negligible to minor adverse impacts on soils and vegetation throughout the national memorial.

The efforts by the National Park Service to educate the public about the natural environment would support other local and regional entities' efforts to conserve and enhance the protection of natural resources in the area. Programs within the region including the memorial would enhance public awareness of the natural environment, which would benefit all natural resources.

Cochise County plans for increased growth in the Southern San Pedro Valley, with some restrictions on the scale and density of the development. Grazing occurs on private lands and in the Coronado National Forest adjacent to the national memorial. The beneficial effects on soils from alternative B would have little cumulative effect on a regional scale when compared to adverse effects offering to soils from increasing urban development and from agriculture in areas surrounding the national memorial.

Conclusion. The impacts on soil resources from development under alternative C, such as visitor parking and trails improvements, would be long term and negligible because of the limited amount of development, the small size of the area affected (less than 1 acre), and the low soil erosion potential of the areas affected. Mitigative measures would be used to minimize erosion and to limit construction activities to the immediate area.

Montezuma Ranch and other areas in the memorial would be restored and revegetated under alternative C than under the other alternatives. Restoring sites would improve soil properties by reducing soil compaction and increasing permeability, causing local long-term negligible to minor beneficial effects on soils.

The development of new employee housing would result in long-term negligible to minor adverse effects on soils, and mitigation measures would be employed to reduce erosion. Programs to interpret, document, and inventory memorial resources and uses would result in long-term negligible benefits to soils in the memorial.

Ending grazing in the memorial would have a long-term minor beneficial effect on soils because nonnative vegetative species would be reduced and native vegetation would increase. Overall, the beneficial effects of alternative C would offset any adverse impacts associated with the limited development.

Vegetation

Analysis. Establishing a program to inventory, document, and interpret natural resources in the memorial would improve the memorial staff's ability to protect vegetation. Developing more interpretive materials and programs would help the public understand the memorial's resources of the memorial and the impacts associated with human activity. This understanding could facilitate NPS efforts to reduce visitors' effects on vegetative communities such as the creation of social trails. Overall, a long-term negligible beneficial effect on vegetation could result from these programs.

Adding parking spaces for four buses or recreational vehicles in the picnic area would result in long-term negligible to minor impacts on vegetation in a previously disturbed area where the soils have a low susceptibility to erosion. Best management practices would be used to reduce or eliminate impacts.

Adding new employee housing in the current residential area north of the visitor center could lead to a loss of vegetation from erosion and compaction as well as from the uprooting and loss of individual plants. However, the area affected would be small (less than 1 acre). Soils that have been excavated and/or covered by impervious surfaces such as roads, parking

lots, or buildings may lack typical physical, biological, and chemical properties. Therefore, the long-term adverse impacts of this development on vegetation would be negligible to minor, and mitigative measures would be used to minimize erosion and to limit construction activities to the immediate area.

Widening the interpretive trail and compacting soils to create a hardened surface for better accessibility would affect local vegetation. The long-term effects would be negligible to minor because the area affected would be small and the existing trail footprint would be used.

Removing the Montezuma Ranch structures, reestablishing the natural contours, and revegetating the area with native species under alternative C would affect vegetation in ways similar to those described for alternative A.

Restoring natural contours and vegetation in areas now occupied by abandoned powerlines, roads, the Montezuma Ranch structures, the former fiesta grounds, the dirt storage area, and social trails and nonhistoric structures would affect less than 50 acres. Restoring and revegetating these sites would restore overall vegetative integrity and ecosystem health. It would result in larger areas of unbroken habitat for wildlife, the removal of nonnative species, and the development of root systems to hold soils in place. The local long-term beneficial effects on vegetation would be negligible to minor.

Restoring the Montezuma Ranch and roads would take place adjacent to a larger intact vegetative community, and the revegetation would help to restore overall vegetative integrity and ecosystem health. The resulting long-term beneficial effects would be similar to those described for alternative A.

Ending grazing in the national memorial would result in effects on vegetation and range condition similar to those described for alternative B.

Cumulative Effects. Similar to alternative B, the encroachment of woody species throughout grasslands in the upper San Pedro Basin is a factor in regional decreases in the amount and ecological functioning of native grasslands and in their fragmentation into small, disconnected patches. Urban development in the region also has resulted in a loss of grassland acreage. Another regional issue is the intrusion of nonnative plant species. Fort Huachuca and Coronado National Forest are trying to prevent the introduction of such species and control their spread. Fort Huachuca is conducting experimental investigation and treatments of Lehmann lovegrass. Ending grazing in the national memorial would benefit the grassland habitat, and restoring native species under alternative B would benefit vegetation. However, the actions of alternative B would not offset the loss of grasslands from development or the invasion of nonnative plants in the region, and implementing the alternative would contribute little cumulatively to regional effects.

Coronado National Memorial is on a smuggling route for undocumented people and illegal drugs. The illegal entry across the United States border into the memorial has resulted in soil compaction and erosion resulting from the development of numerous footpaths. In addition, vegetation in the memorial would be affected to a negligible degree by visitor use of trails and picnic areas. Visitor use results in soil compaction and erosion along existing trails and the creation of social trails, which results in uprooting and damage to vegetation in the local area. These activities, along with the development of additional employee housing, would result in negligible to minor adverse impacts on soils throughout the national memorial.

The efforts by the National Park Service to educate the public about the natural environment would support other local and regional entities' efforts to conserve and enhance the protection of natural resources in the area. Programs within the region including

the memorial would enhance public awareness of the natural environment, which would benefit all natural resources.

Conclusion. Adding more visitor parking would result in long-term negligible effects on vegetation because the development would be limited and the area affected would be less than 1 acre. Mitigative measures would be used to minimize erosion and to limit construction activities to the immediate area.

The development of new employee housing would result in long-term negligible to minor adverse effects on vegetation, and mitigation measures would be employed. Programs to interpret, document, and inventory memorial resources and uses would result in long-term negligible benefits to vegetation in the memorial.

More areas in the memorial would be restored and revegetated under alternative C than under the other alternatives. The impacts from development under alternative C would be long term and negligible because of the limited amount of development and the small size of the area affected (less than 1 acre). Restoring sites would improve ecosystem health and integrity by reducing nonnative species and reestablishing native plant species, a long-term local negligible to minor beneficial effect on vegetation.

Eliminating grazing from the memorial would have a long-term minor beneficial effect on vegetation and range condition because nonnative vegetative species would be reduced and native vegetation would increase. Overall, the beneficial effects of this alternative would offset any adverse impacts associated with the limited development.

Threatened, Endangered, or Sensitive Species

Analysis. The knowledge gained through establishing an inventory program would enable NPS personnel to better protect sensitive resources such as threatened and endangered species. Educating the public through new interpretive materials could help to reduce the adverse impacts on resources that sensitive species rely on. Overall, developing interpretive programs would result in a beneficial effect on threatened, endangered, or sensitive species.

Adding parking for buses or recreational vehicles on previously disturbed land would affect only a small area in the memorial and would not measurably affect vegetation or wildlife in grassland habitat. Since these activities would not affect grassland vegetation or wildlife habitat; they would not disturb the food sources of the nectar-feeding bats or the loggerhead shrike and would not affect the roosting sites of lesser long-nosed bats or Mexican long-tongued bats. Therefore, these activities would not result in any direct effects on the lesser long-nosed bat, the Mexican long-tongued bat, or the loggerhead shrike.

The added parking facilities, the upgraded interpretive trail, and the housing development would be in pine-oak-juniper forests, potential foraging habitat of the Mexican spotted owl. The development and the expanded recreational facilities of alternative C might alter the foraging habitat and its use by the owl (USFWS 1995b). However, since these developments would take place in previously disturbed areas that are frequently used by visitors, it is likely that the owls avoid these areas when foraging. Therefore, the effects from the developments, which would not be in the proposed protected activity center, would be short-term, indirect, and negligible, and the species would not be likely to be adversely affected.

Removing the Montezuma Ranch structures and restoring the area would result effects similar to those described for alternative A. Long-term indirect minor beneficial effects would result from increasing the prey habitat of the lesser long-nosed bat, the Mexican long-tongued bat, and the loggerhead shrike.

Because the ranch area is not in prime owl foraging or nesting habitat, removing the ranch structures would not adversely affect the Mexican spotted owl.

Restoring and revegetating East Forest Lane would result in the same effects on the lesser long-nosed bat, the Mexican long-tongued bat, and the loggerhead shrike as those described for Alternative A. The structure removal probably would increase habitat and prey species for the loggerhead shrike and increase the number of agave plants, a food source of the nectar-feeding bats. These actions would not be likely to adversely affect these species but would result in long-term negligible to minor beneficial effects.

Removing the powerlines along the road to Montezuma Pass and revegetating the area would result in the same effects on the Mexican spotted owl as described for alternative B. Short-term indirect negligible effects could result from human presence and activity, which probably would cause the owls to avoid the area when foraging. However, revegetating the area would cause a negligible to minor benefit for the species by increasing available habitat for its prey. With mitigation to limit powerline removal to a time not in the owl's breeding season, this activity might affect but would not be likely to adversely affect this species.

Eliminating grazing from the memorial under alternative C would cause the same effects on threatened, endangered, or sensitive species as those described for alternative B. Ending grazing would not be likely to adversely affect the endangered lesser long-nosed bat. Because suitable nesting and foraging habitat for the Mexican spotted owl is lacking in the grazing allotments, it is unlikely that the owls use these areas. Therefore, stopping grazing in the memorial would not be likely to adversely affect this species.

Cumulative Effects. As in alternative B, efforts by the National Park Service to educate the public about the natural environment would support other local and regional entities' efforts to conserve and enhance the protection of natural resources in the area. Natural areas adjacent to the memorial such as the national forests, the national conservation area, and state parks offer interpretive programs and provide visitor information related to the unique natural environment found in the region. These programs along with enhanced interpretation and inventorying of memorial resources that enhance public awareness and understanding of the natural environment would benefit all natural resources.

A loss of trees in the memorial and the resultant growth of high elevation grasses since the wildfires of 1988 have resulted in an increase in rodent species, which has increased the availability of prey for the loggerhead shrike, a minor beneficial effect for the shrikes and their prey. Eliminating grazing under alternative C would increase grassland habitat and small mammal habitat, which would increase the prey abundance for the shrike. Ending grazing in the memorial, combined with the effects of the past fire, would result in a minor cumulative benefit to the loggerhead shrike.

As has been mentioned, wildfire is the primary threat to the persistence and recovery of the Mexican spotted owl (USFWS 1995b). The loss of owl habitat in the memorial from the 1988 wildfire, together with the potential for future catastrophic fire, represents a moderate to major threat to this species. Limiting the removal of powerlines in the proposed protected activity center to a time not in the owl's breeding season would cause negligible effects on the species. This activity, combined with habitat loss from wildfire, would cause moderate to major effects on the Mexican spotted owl. Actions to reduce hazardous fuel loads in Coronado National Forest, which would be identified in a future fire management plan and are currently underway on Fort Huachuca, would cumulatively benefit the owls by reducing the likelihood of habitat alteration.

The restoration of grassland on Fort Huachuca is improving the ecological integrity and function of native grasslands. Prescribed burns on private and public lands are being used to maintain grasslands, which might increase the region's agave population, a minor to moderate benefit for nectar-feeding bats in the region. Alternative C would make a negligible contribution to these beneficial effects on grasslands and nectar-feeding bats. The overall beneficial cumulative effect on listed and sensitive bat species in the region would range up to moderate.

Conclusion. Programs to interpret, document, and inventory memorial resources and uses would result in a long-term negligible benefits to threatened and endangered or sensitive species in the memorial.

Adding parking for buses and recreational vehicles would not affect the long-nosed bat, the Mexican long-tongued bat or the loggerhead shrike because these actions would not take place in the grassland areas of the memorial, where the predominant forage for these species is found. The developments would be placed in owl foraging habitat outside the protected activity centers, and they would be in areas already used by visitors, so it is likely that the owls avoid these areas when foraging. Therefore, the effects from the developments would be short-term, indirect, and negligible, and these species would not be likely to be adversely affected.

Removing powerlines in the proposed protected activity center for the Mexican spotted owl at a time not in the owl's breeding season might cause the owls to avoid the area when foraging but it would not adversely affect the species.

Removing the Montezuma Ranch structures would disturb a small area and might result in the loss of individual agave plants, the food base of the lesser long-nosed and Mexican long-tongued bat. The action also might displace prey species of the loggerhead shrike. Therefore, removing the structures might indirectly affect but would not be likely to adversely affect these listed or sensitive species. The ranch area is not in prime foraging or nesting habitat for the Mexican spotted owl, and there is low availability of the owl's prey species in this location; therefore, removing the ranch structures would not be likely to adversely affect the Mexican spotted owl.

Restoring and revegetating the ranch area after removing the structures might increase the number of agave plants, resulting in more available food for nectar-feeding bats. Revegetating the area probably would increase the habitat and prey species of the loggerhead shrikes. Thus, there would be beneficial effects on the lesser long-nosed and Mexican long-tongued bat and the loggerhead shrike, and the restoration would not be likely to adversely affect these species. Because only a small part the memorial would be affected, this alternative might affect the lesser long-nosed and Mexican long-tongued bats and the loggerhead shrike but would not be likely to adversely affect these species.

It is unlikely that Mexican spotted owls use the grazing allotments; therefore discontinuing grazing would likely not affect these owls.

Ending grazing in the memorial would have a negligible effect on nectar-feeding bats. but would not be likely to adversely affect these species.

Ending grazing in the memorial might increase the prey base and nesting habitat for loggerhead shrikes.

Water Quality

Analysis. Better protection of soils and vegetation through a monitoring program would lead to better protection of water quality, an overall beneficial effect on water quality under this alternative. Developing new employee housing would not affect riparian

habitat, and mitigative measures would include actions to minimize erosion by stabilization with structures or vegetation. Therefore, there would be no adverse impact on water quality from building new housing.

Adding parking spaces for four buses or recreational vehicles in an existing footprint would result in negligible effects on water quality because the development would not take place in riparian areas or adjacent to a stream channel.

The effects on water quality from removing the Montezuma Ranch structures, reestablishing the natural contours, and revegetating the area with native species would be similar to those described for alternative A.

Restoring abandoned roads, the dirt storage area, the former fiesta grounds, and social trails to natural contours and revegetating the areas would affect water quality in ways similar to those described for alternative B.

Ending grazing in the memorial under alternative C would result in effects on water quality similar to those described for alternative B.

Cumulative Effects. Similar to alternative B, recreation, cattle grazing, ranching, road construction, water diversion, and urban development in the region all cumulatively affect soils, vegetation, and riparian environments, and consequently water quality. Developing additional employee housing in the memorial would not contribute to the cumulative effects of these other activities occurring in the region.

Erosion and pollution control measures at Fort Huachuca and Coronado National Forest would reduce potential water quality impacts in the San Pedro River basin. Implementing alternative B at Coronado National Memorial would reduce erosion, consequently reducing a potential source of sediment and turbidity in the San Pedro River channels. The actions of alternative B also would support the goals of the Upper San Pedro Partnership to manage drainages in the Upper San Pedro River basin so as to decrease erosion from runoff, adding cumulatively to the beneficial effects on water quality from actions by other public agencies.

Conclusion. No adverse effects on water quality would be anticipated from developing additional employee housing. The establishment of monitoring programs in the memorial to monitor activities such as grazing would benefit overall water quality in the memorial.

The effects on water quality from adding a few more parking spaces in an existing footprint would be negligible because the area affected would be small, the actions would not take place in riparian habitat or adjacent to a stream channel, and mitigating measures would be used to reduce impacts.

Removing the Montezuma Ranch structures and restoring and revegetating the area would have negligible effects on water quality.

Restoring and revegetating more sites than in the other action alternatives would result in negligible to minor improvements in water quality by reducing sedimentation into drainages. Ending grazing in the memorial would result in a long-term minor beneficial effect on water quality. Overall, the beneficial effects of alternative C on water quality would offset any adverse impacts associated with the limited development.

Ending grazing in the memorial would improve water quality by decreasing sedimentation and reducing fecal coliform and other microbes, a long-term minor beneficial effect on riparian habitats and water quality. Overall, the beneficial effects on water quality from this alternative would offset any adverse impacts associated with development.

Wildlife

Analysis. Through knowledge gained from an inventory and monitoring program, national memorial staff could better protect wildlife habitat. Educating the public with interpretive materials could reduce impacts on wildlife and habitat from visitor use. Overall, developing interpretive programs would result in a beneficial effect on wildlife.

New employee housing would affect wildlife in that mobile animals would move during development to similar adjacent habitats, and slow or sedentary animals such as some reptiles, amphibians, and small mammals might be lost. For animal species that are common in the memorial, the construction would have negligible adverse effects. The rare or uncommon species that are slow or sedentary, particularly amphibians and reptiles, would be more susceptible to adverse effects from construction. However, with mitigating measures to reduce the potential loss of individuals of rare or uncommon species, the long-term adverse effects on wildlife would be negligible to minor.

Developing more parking spaces for buses and recreational vehicles would cause negligible adverse effects on wildlife similar to those described for alternative B, as would upgrading the interpretive trail and making it accessible.

Removing the Montezuma Ranch structures under alternative C would result in short-term negligible adverse effects on wildlife; reestablishing the natural contours and revegetating the area with native species would result in more ground cover and habitat for small rodent species, which with mitigation measures, would offset these adverse impacts in a manner similar to that described in alternative A.

Restoring and revegetating East Forest Lane and removing the powerline along the main road would increase habitat and food for many wildlife species. The long-term benefits to wildlife species from the restoration would range from negligible to minor, because the size of area that would be restored is small relative to the size of the memorial.

Ending grazing in the national memorial under alternative C would result in effects on wildlife similar to those described for alternative B.

Similar to the effects described in alternative B, eliminating grazing from the national memorial would reduce the impacts on soils and vegetation, benefiting some wildlife species by making more food and cover available. Ground cover would be increased, making more and better grassland available for bird nesting. The quality of habitat for most wildlife under alternative C would be better than under alternative A. Studies in the memorial have shown that more grassland habitat has led to an increase in small mammal diversity and in their predators, such as the western diamondback rattlesnake (Swann, Alberti, and Schwalbe 2001).

Ending grazing in the memorial, as described in alternative B, might result in the loss of some species that prefer more open, desertlike habitat created by grazing. The coachwhip was the second most abundant snake species at Coronado in 1979 (Cockrum et al. 1979); however, in a recent survey, the species was found to be rare (Swann et al. 2000). The decline was attributed to a lack of grazing on the Montezuma allotment, which altered the habitat. The reduced impact on riparian vegetation would increase cover and nesting habitat, beneficially affecting species such as migrating birds, deer, and predators that use the drainages on the allotments as corridors. Overall, eliminating grazing under alternative C would result in minor long-term beneficial effects on wildlife.

Cumulative Effects. The cumulative effects of alternative C on wildlife would be similar to those described for alternative B. These include the adverse effects of poaching and collecting in the memorial and on nearby

public lands, the effects on animal movement from the border patrol infrastructure project, the results of timber harvest in the Coronado National Forest, and increased grazing and roadbuilding on adjacent properties. Other cumulative effects would be the beneficial effects from the restoration of grasslands at Fort Huachuca and from the forest conservation actions in the mountains of southeastern Arizona and the Upper San Pedro Valley. Implementing alternative C would make a minor long-term contribution to local beneficial effects on wildlife species.

Developments by the border patrol to improve roads and install fencing and lighting adversely affect wildlife by impeding movement, altering feeding patterns, and reducing habitat quality for nesting and feeding. Development, grazing, and loss of habitat in areas adjacent to the national memorial and in the San Pedro River valley might result in the loss of more wildlife species from the memorial. Timber harvesting and hunting in the adjacent Coronado National Forest would reduce available wildlife habitat, alter animal behaviors, and results in the removal of individuals. Although thought to be rare in the memorial, poaching of reptiles and amphibians results in a loss of individuals and may reduce populations of rare or uncommon species in the region. Development within the national memorial including new employee housing which would result in the loss of a small portion of wildlife habitat would contribute negligibly to the adverse cumulative effects of these other regional activities.

The efforts by the National Park Service to educate the public about the natural environment would support other local and regional entities efforts to conserve and enhance the protection of natural resources in the area. Programs within the region including the memorial that enhance public awareness of the natural environment help to protect sensitive areas such as riparian areas. Protection of these areas conserve wildlife habitat and benefit wildlife within the region.

Conclusion. Programs to interpret, document, and inventory memorial resources and uses would result in a long-term negligible benefits on threatened and endangered or sensitive species in the memorial. Loss of a small portion of wildlife habitat and the potential for loss of sedentary individual animals from development of new employee housing would have long-term negligible to minor adverse effects.

Adding parking for buses and recreational vehicles would result in negligible effects on wildlife in the memorial. The long-term adverse effects on wildlife from removing the Montezuma Ranch structures would be negligible with the implementation of mitigating measures to reduce impacts on rare or uncommon species. Restoring and revegetating areas in the memorial would improve grassland habitat, benefiting wildlife species. Ending grazing in the memorial would improve habitat and forage, a long-term minor beneficial effect on wildlife.

Impairment

The wildlife resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of resources or values related to air quality; cave resources, soils; vegetation; threatened, endangered, or sensitive species; water quality; or wildlife would result from implementing alternative C.

ALTERNATIVE D

Air Quality

Analysis. Alternative D would affect local air quality through the fugitive dust and emissions that would result from restoration and revegetation, trail development, road and parking lot improvements, installing a new viewing structure, re the visitor center, and building a new educational facility. The effects on local air quality would be highly transient but could be noticeable to visitors and NPS staff. The adverse effects on local air quality would be negligible to minor. None of these activities would affect regional air quality.

Cumulative Effects. The actions of alternative D would not adversely affect air quality. The air quality would be more likely to be affected by the population growth in Cochise County and the pollution brought by prevailing winds. The construction activities and increased traffic that would occur under alternative D would result in local negligible to minor transient effects on air quality, and there would be no effects on regional air quality from alternative D

Conclusion. The construction and revegetation of alternative D, along with more traffic generated by increased visitation, would cause short-term negligible to minor adverse effects on local air quality at Coronado National Memorial, but the actions of alternative D would not affect regional air quality.

Cave Resources

Analysis. There are a number of caves in the national memorial, with Coronado Cave being the most prominent and accessible (0.75 mile from the visitor center). This has resulted in a visitation, by permit, of between 5% and 6% of the people that currently come to the memorial. The cave contains various limestone formations (stalactites, stalagmites, flowstone, and helicites) and provides habitat for animals. Occasionally visitors might cause slight damage to cave resources. In any one year, the damage results in negligible to minor adverse effects on cave resources. Developing a carrying capacity for Coronado Cave would result in the establishment of a monitoring system that would measure any loss of cave resources so that corrective measures could be taken. However, the loss of resources year after year could eventually result in minor long-term adverse effects on cave resources.

Cumulative Effects. The opening of Kartchner Caverns State Park about 35 miles north of the memorial has increased the interest of the visitors in caves. This interest added to the accessibility of Coronado Cave has resulted in a slight increase in visitation to the memorial's cave. This increased interest in caves has resulted in a slight loss of sensitive cave resources in the area of Cochise County.

Conclusion. There would be beneficial effects on Coronado Cave. The intensity of these effects would be difficult to quantify before the carrying capacity is determined, but the effects would be long term and probably would be negligible to minor.

Soils

Analysis. Establishing a program to inventory, document, and interpret natural resources in the memorial would improve the memorial staff's ability to protect soil resources. Developing more interpretive materials and programs would help the public understand the memorial's resources of the memorial and the impacts associated with human activity. This understanding could facilitate NPS efforts to reduce visitors' effects on soil resources such as the creation of social trails or paths. Overall, a long-term negligible beneficial effect on soils could result from these programs.

Expanding the visitor center and adding picnic sites would result in adverse impacts on soils, but the impacts would be negligible to minor because about 70% of the development

would be in previously disturbed areas, the size of the area affected would be limited, and the erosion potential of the soils that would be affected is low.

Mitigating measures would limit erosion and confine construction activities to the immediate area. Therefore, the impacts would be negligible to minor.

Widening and paving East Forest Lane to accommodate recreational vehicles and other large vehicles, paving parking areas, and paving the road to Montezuma Ranch would compact the soils and reduce soil permeability. This would lead to more surface runoff, making slopes more vulnerable to erosion, which would increase the amount of soil eroded along the dry stream channel. This would cause higher rates of stream sedimentation in the short term. Mitigating measures would minimize erosion and limit construction activity to the immediate area.

The soils associated with the East Forest Lane road have a low erosion potential except where the road traverses the drainage, where wind erosion potentials are high (map unit 17, table 10, p. 90). The total area that would be affected by paving the road is less than 20 acres. Therefore, the local short-term and long-term adverse effects on soils would be negligible to minor, and the effects would diminish over time as the area revegetates.

Adding new employee housing in the current residential area north of the visitor center could lead to a loss of soils from erosion and compaction. However, the area affected would be small (less than 1 acre). Soils that have been excavated and/or covered by impervious surfaces such as roads, parking lots, or buildings may lack typical physical, biological, and chemical properties. Therefore, the long-term adverse impacts of this development on soils would be negligible to minor, and mitigative measures would be used to minimize erosion and to limit construction activities to the immediate area.

Development and use of four new trails in previously grazed areas in the memorial's grasslands would erode and compact soils as described for alternative B. Placing three of the four trails on existing social paths or in an existing footprint such as Windmill Road would limit the disturbance of soils because these areas have been disturbed previously either by grazing or by foot traffic. Short-term and long-term adverse impacts would result from new trail construction in the grassland habitat. Because of the small area affected in relation to the size of the national memorial, the low erosion potentials of the soils, and the use of best management practices, the impacts would negligible to minor.

Adapting the Montezuma Ranch structures for use as an educational center would result in negligible adverse impacts on soils because the area has been previously disturbed, and existing roads and walkways could be used to park construction vehicles and staging equipment.

Removing the existing ranch structures and building new structures would result in more impacts than adapting the existing buildings for this use because more ground disturbance would be necessary. Soils would be compacted and erosion increased during the construction of the educational center, but because the site has been previously disturbed and the susceptibility of the soils to erosion is low, the short-term and long-term adverse impacts on soils would be negligible to minor.

Eliminating grazing from the Montezuma allotment and continuing it on the Joe's Spring allotment (1,143 acres, or 25% of the national memorial) under alternative D would affect soils in ways similar to those described for alternative A. Allowing grazing on only one allotment would reduce the area of the national memorial grazed compared to the no-action alternative.

The ongoing implementation of the *Livestock Management Plan* (NPS 2000b) is improving conditions in both grazing allotments com-

pared to pre-plan conditions. Alternative D, which would eliminate grazing in the Montezuma allotment, would further improve soil conditions in this area. This would be a long-term minor beneficial effect compared to the no-action alternative. However, the adverse effects of grazing on soils in the Joe's Spring allotment would continue under alternative D.

Cumulative Effects. Similar to alternative A, because the national memorial is on a smuggling route for undocumented people and illegal drugs, such use has resulted in the creation of many footpaths, especially along drainages. The construction of a fence by the U.S. Border Patrol at the United States–Mexican border might funnel foot traffic westward into the memorial, which would create more footpaths, degrading soils and vegetation. In addition, soils in the memorial would be affected to a negligible degree by visitor use of trails and picnic areas. Soil compaction and erosion would occur along existing trails and by the creation of social trails. Similar effects result from the development of game trails by wildlife in the area. These activities, along with the activities associated with the no-action alternative, would result in minor adverse impacts on soils throughout the national memorial.

The efforts by the National Park Service to educate the public about the natural environment would support other local and regional entities' efforts to conserve and enhance the protection of natural resources in the area. Programs within the region including the memorial would enhance public awareness of the natural environment, which would benefit all natural resources.

Conclusion. Expanding the visitor center and adding picnic sites with low erosion potential would result in negligible to minor adverse effects on soils because these actions would take place in small previously disturbed areas. Mitigative measures would minimize erosion and limit construction to the immediate area.

The short-term and long-term adverse effects on soils from paving roads, developing parking areas and trails, and developing an educational center at Montezuma Ranch would be negligible to minor because the area affected would be small, and best management practices would be used to reduce soil impacts.

The development of new employee housing would result in long-term negligible to minor adverse effects on soils, and mitigation measures would be employed to reduce erosion. Programs to interpret, document, and inventory memorial resources and uses would result in long-term negligible benefits to soils in the memorial.

Continuing grazing in the Joe's Spring allotment would result in minor long-term adverse impacts on soils, but they would be offset by eliminating grazing from the Montezuma allotment.

Vegetation

Analysis. Establishing a program to inventory, document, and interpret natural resources in the memorial would improve the memorial staff's ability to protect vegetation. Developing more interpretive materials and programs would help the public understand the memorial's resources of the memorial and the impacts associated with human activity. This understanding could facilitate NPS efforts to reduce visitors' effects on vegetative communities such as the creation of social trails. Overall, a long-term negligible beneficial effect on vegetation could result from these programs.

Expanding the visitor center and adding picnic sites would adversely affect vegetation, but the effects would be negligible to minor because about 70% of the development would be in previously disturbed areas and the size of the affected area would be limited. There would be fewer impacts on vegetation than would be caused by construction in

undisturbed sites. Plant communities that have been fragmented and disturbed have a greater potential for the presence of nonnative species, reducing the ecological health and integrity of the area. Mitigating measures would limit erosion and limit construction activities to the immediate area, so the impacts would be negligible to minor.

Widening and paving East Forest Lane, which parallels and traverses a drainage, would result in the removal of riparian vegetation in the western honey mesquite–mixed short tree woodland association, further increasing erosion into the stream channel, which would contribute to higher rates of stream sedimentation. The local long-term adverse impacts on riparian vegetation would be minor because only a small area would be affected and mitigating measures would be implemented to reduce erosion and reestablish vegetation. Vegetation along the road and in the parking areas would be adversely affected. Only the vegetation in the area adjacent to the development would be affected, and mitigating measures would minimize erosion and limit construction activity to the immediate area.

The loss of individual plants from trampling and uprooting and the potential for more nonnative plants to invade disturbed areas would be a short-term adverse effect. The total area that would be paved is less than 20 acres; therefore, the local short-term and long-term adverse effects on vegetation would be negligible to minor. The adverse effects would diminish over time as the area revegetated.

Adding new employee housing in the current residential area north of the visitor center could lead to a loss of vegetation from erosion and compaction as well as from the uprooting and loss of individual plants. However, the area affected would be small (less than 1 acre). Soils that have been excavated and/or covered by impervious surfaces such as roads, parking lots, or buildings may lack typical physical, biological, and chemical properties. Therefore, the long-term adverse impacts of this development on vegetation would be negligible to minor, and mitigative measures would be used to minimize erosion and to limit construction activities to the immediate area.

Developing four new trails in previously grazed areas in the grasslands would result in the same effects on vegetation as those described for alternative B. Placing three of the four trails on existing social paths or in an existing footprint such as Windmill Road would limit the disturbance of soils and vegetation because these areas have been disturbed previously either by grazing or foot traffic. Short-term and long-term adverse impacts would result from new trail construction in the grassland habitat. Because of the small area affected in relation to the size of the national memorial, the low erosion potentials of the soils, and the use of best management practices, the impacts would negligible to minor.

Removing the Montezuma Ranch structures and replacing them with new buildings or adapting them for use as an educational center would result in the disturbance, trampling, and uprooting of grassland vegetation from the use and staging of construction equipment. Mitigating measures would reduce erosion and limit equipment to the immediate vicinity, so that the local adverse impacts on vegetation would be negligible to minor. Adapting the existing structures for use as the educational center would cause fewer impacts on vegetation in the immediate area than would building new structures because there would be less construction. The local adverse effects would be negligible, and the overall effects on vegetation throughout the memorial from either scenario would be negligible because only a small area would be affected.

Eliminating grazing from the Montezuma allotment and continuing it in the Joe's Spring allotment would cause impacts on vegetation similar to those described for alternative A. The vegetative communities affected would be those that are predominantly oak-Mexican piñon-juniper and grama species mixed

grass-mixed shrub associations, which constitute 93% of the memorial's total vegetation. However, allowing grazing on only one allotment would reduce by 14% the area of the national memorial grazed compared to the no-action alternative. The long-term adverse impacts on vegetation from grazing would be minor. As under the no-action alternative, the effects would be partially mitigated by reducing grazing intensity and shortening the season of use, and livestock use of riparian areas would be mitigated by controlling water sources, using salt blocks, and following an adaptive management approach. The effects of continued grazing on range condition would be similar to those of alternative A, but slightly fewer.

Cumulative Effects. Similar to alternative A, the footpaths along drainages resulting from the smuggling route for undocumented people and illegal drugs, along with the creation of more footpaths resulting from the construction of a fence by the U.S. Border Patrol, could degrade vegetation. This, along with the actions of the no-action alternative, would result in minor adverse impacts on vegetation throughout the memorial.

In June 1988 Coronado National Memorial was affected by the Peak Fire. In the memorial, the oak-Mexican piñon pine-juniper woodland association was most affected by the fast-moving, intense fire in continuous grass fuels because about 2,600 acres of the 3,700 acres that burned were in this habitat. Most of this biotic community was burned moderately, but some areas in the western part of the memorial were severely burned. However, by August 1989 many trees had resprouted either from the roots or from undamaged areas of the trunk.

The species composition of the woodland understory was significantly changed after the fire, probably because of the influx of nutrients or appropriate conditions for the germination of numerous herbaceous species that were either rare or absent before the fire. The grama grass-mixed grass-mixed shrub association was relatively unaffected by the fire because little fuel was present to sustain a high temperature. Consequently, the effect of the fire on this habitat was largely ephemeral because most of these species are fire-adapted and quickly resprout from roots. Under alternative D, vegetation would be disturbed, which would affect mainly grassland habitats; therefore, these disturbances would contribute little cumulatively to the past impacts of the 1988 wildfire.

Regionally, wildland fire is an increasing threat in scale and severity. Developing a fire management plan would reduce hazardous fuels in the memorial, diminishing the potential for wildland fire in the memorial and beyond its boundaries. A future fire management plan, in combination with similar plans for Coronado National Forest and Fort Huachuca, would result in long-term minor benefits for vegetation in the region.

The encroachment of woody species into grasslands in the upper San Pedro Basin is a factor in regional decreases in the amount and ecological functioning of native grasslands and in their fragmentation into small, disconnected patches. Regional urban development also results in a loss of grassland acreage. Continuing grazing in the memorial would increase native shrubs, contributing to these cumulative adverse regional effects. Experimental investigation and treatments of Lehmann lovegrass are being conducted on Fort Huachuca. The no-action alternative would not contribute cumulatively to regional impacts on grasslands.

The efforts by the National Park Service to educate the public about the natural environment would support other local and regional entities' efforts to conserve and enhance the protection of natural resources in the area. Programs within the region including the memorial would enhance public awareness of the natural environment, which would benefit all natural resources.

Conclusion. Expanding the visitor center and adding picnic sites with low erosion potential would result in negligible to minor adverse effects on vegetation because these actions would take place in previously disturbed areas and the areas would be small. Mitigative measures would minimize erosion and limit construction activities to the immediate area.

The development of new employee housing would result in long-term negligible to minor adverse effects on vegetation, and mitigation measures would be employed. Programs to interpret, document, and inventory memorial resources and uses would result in long-term negligible benefits to vegetation in the memorial.

Individual plants would be trampled and uprooted during the paving of roads and parking areas and the development of trails. The short-term and long-term adverse impacts on vegetation from paving roads, developing parking areas and trails, and developing an educational center would be negligible to minor because the area affected would be small and best management practices would be used to reduce impacts. Only the vegetation in the area adjacent to the development would be affected. The adverse effects would diminish over time as the area revegetated.

Grazing in the Joe's Spring allotment would continue to adversely affect vegetation in the memorial, but the minor long-term adverse effects would be offset by the beneficial effects from ending grazing in the Montezuma allotment.

Threatened, Endangered, or Sensitive Species

Analysis. The knowledge gained through establishing an inventory program would enable NPS personnel to better protect sensitive resources such as threatened and endangered species. Educating the public through new interpretive materials could help to reduce the adverse impacts on resources that sensitive species rely on. Overall, developing interpretive programs would result in a beneficial effect on threatened, endangered, or sensitive species.

Placing about 70% of the development (visitor center expansion, added trails, parking lots, pullouts) in previously disturbed areas would not directly affect any listed or sensitive species. The development would disturb the food sources of the lesser long-nosed bat, the Mexican long-tongue bat and the loggerhead shrike, resulting in indirect negligible effects. Individuals of small mammal or reptile species that are prey for loggerhead shrikes might be displaced by development activities, an adverse effect, but there would not be any measurable effect on population densities.

Vegetative resources would be most affected by widening and paving East Forest Lane road. The adverse effects of road construction on vegetation would be minor to moderate in the road area but negligible as related to the overall national memorial. With mitigation to transplant agaves in construction sites to prevent the loss of important food sources for nectar-feeding bats, the development activities of alternative D would not alter the population of agave plants.

Development activities might affect the lesser long-nosed and Mexican long-tongued bat and the loggerhead shrike but would not be likely to adversely affect these species. Because the area where the development would occur is not in prime foraging or nesting habitat for the Mexican spotted owl, these activities would not be likely to adversely affect this species.

Adapting the Montezuma Ranch structures for use as an educational center or removing them and building new buildings would result in negligible to minor adverse effects on listed or sensitive species similar to the effects of removing the ranch structures described for alternative A. Adapting the existing structures for use as the educational center would result

in fewer impacts on sensitive species in the immediate area than would building new buildings. The indirect effects on the long-nosed bat, the Mexican long-tongued bat, and the loggerhead shrike would be negligible, and the activities would not be likely to adversely affect these species.

The adverse impacts of grazing on vegetation and wildlife would continue in the Joe's Spring allotment under alternative D, causing indirect effects on the loggerhead shrike similar to those described for alternative A. Alternative D would have a negligible effect on nectar-feeding bats and would not be likely to adversely affect the lesser long-nosed bats.

Because suitable nesting and foraging habitat for the Mexican spotted owl is lacking in the Joe's Spring allotment, it is unlikely that the owls use that allotment. Continued grazing in the Joe's Spring allotment under alternative D might affect, but would not be likely to adversely affect, the Mexican spotted owl.

Cumulative Effects. Similar to alternative B, efforts by the National Park Service to educate the public about the natural environment would support other local and regional entities' efforts to conserve and enhance the protection of natural resources in the area. Natural areas adjacent to the memorial such as the national forests, the national conservation area, and state parks offer interpretive programs and provide visitor information related to the unique natural environment found in the region. These programs along with enhanced interpretation and inventorying of memorial resources that enhance public awareness and understanding of the natural environment would benefit all natural resources.

A loss of trees in the memorial and the resultant growth of high elevation grasses since the wildfires of 1988 have resulted in an increase in rodent species, which has increased the availability of prey for the loggerhead shrike, a minor beneficial effect for the shrikes and their prey. Eliminating a portion of the grazing under alternative D would increase grassland habitat and small mammal habitat, which would increase the prey abundance for the shrike. Ending some grazing in the memorial, combined with the effects of the past fire, would result in a minor cumulative benefit to the loggerhead shrike.

As has been mentioned, wildfire is the primary threat to the persistence and recovery of the Mexican spotted owl (USFWS 1995b). The loss of owl habitat in the memorial from the 1988 wildfire, together with the potential for future catastrophic fire, represents a moderate to major threat to this species. Limiting the removal of powerlines in the proposed protected activity center to a time not in the owl's breeding season would cause negligible effects on the species. This activity, combined with habitat loss from wildfire, would cause moderate to major effects on the Mexican spotted owl. Actions to reduce hazardous fuel loads in Coronado National Forest, which would be identified in a future fire management plan and are currently underway on Fort Huachuca, would cumulatively benefit the owls by reducing the likelihood of habitat alteration.

The restoration of grassland on Fort Huachuca is improving the ecological integrity and function of native grasslands. Prescribed burns on private and public lands are being used to maintain grasslands, which might increase the region's agave population, a minor to moderate benefit for nectar-feeding bats in the region. Alternative D would make a negligible contribution to these beneficial effects on grasslands and nectar-feeding bats. The overall beneficial cumulative effect on listed and sensitive bat species in the region would range up to moderate.

Conclusion. Programs to interpret, document, and inventory memorial resources and uses would result in a long-term negligible benefits to threatened and endangered or sensitive species in the memorial.

The development-related activities of alternative D north of the main memorial road would not alter the population of agave plants, which are the food source of the lesser long-nosed and Mexican long-tongued bats. However, individual plants might be disturbed by building trails in grasslands or by paving roads and parking areas. These activities would not alter the populations of small mammals and reptiles that are the prey base of the loggerhead shrike There might be indirect negligible effects, but it is not likely that there would be adverse effects on these species.

The developments north of the main memorial road would not be in prime Mexican spotted owl foraging or nesting habitat, and the availability of the owl's prey species in this area is low. Therefore, the developments of alternative D would not be likely to adversely affect the Mexican spotted owl.

Adapting the Montezuma Ranch structures for use as an educational center or removing them and building new buildings would disturb agave plants and small mammals that are food sources for loggerhead shrikes, lesser long-nosed bats, and Mexican long-tongued bats, resulting in negligible to minor indirect effects on these species. Adapting the structures would not be likely to adversely affect these species.

Restoring and revegetating the ranch area after the area is developed as an educational center would result in about the same number of agave plants as currently. Revegetation of the area probably would maintain the habitat and prey species of the loggerhead shrikes. Thus there would be long-term negligible effects on these species.

It is unlikely that Mexican spotted owls use the grazing allotments. Therefore, gazing associated with this alternative would not be likely to adversely affect this species.

Grazing associated with alternative D would have a negligible effect on nectar-feeding bats and would not be likely to adversely affect the lesser long-nosed bat.

Continued grazing on the Joe's Spring allotment would disturb the food sources of the loggerhead shrike, indirectly affecting this species.

Water Quality

Analysis. Better protection of soils and vegetation through a monitoring program would lead to better protection of water quality, an overall beneficial effect on water quality under this alternative. Developing new employee housing would not affect riparian habitat, and mitigative measures would include actions to minimize erosion by stabilization with structures or vegetation. Therefore, there would be no adverse impact on water quality from building new housing.

Expanding the visitor center and pullouts and adding more picnic sites under alternative D would affect water quality in ways similar to those described for alternative B. The adverse effects would be negligible to minor because most of the development would be in previously disturbed areas, the developments would be located away from stream channels, and mitigative measures would limit construction activities to the immediate area and minimize erosion and sedimentation.

Widening and paving East Forest Lane, which parallels and traverses a drainage, would compact the soils, reducing soil permeability. This would lead to more surface runoff, which would make slopes more vulnerable to erosion, increasing sedimentation during construction. The widening and paving also would result in the removal of riparian vegetation in the western honey mesquite-mixed short tree woodland association, further increasing erosion into the stream channel, which would contribute to higher rates of stream sedimentation. The short-term adverse impacts on water quality would be minor because the area affected would be

small, and the effects would lessen over time with the reestablishment of vegetation, so that the long-term effects would be negligible.

Developing three new trails, if they were designed to cross drainages, would affect a small part of the riparian habitat, causing the loss of riparian vegetation and soils, consequently affecting water quality. The short-term adverse effects on water quality from new trail development would be minor with the implementation of mitigating measures to reduce the disturbance of streambanks and vegetation, and the long-term effects would be reduced by the reestablishment of riparian vegetation, which would reduce streambank erosion and sedimentation.

Removing the Montezuma Ranch structures and building an educational center or converting the existing buildings to an educational center would not take place near drainages or riparian habitats, and best management practices would be used to reduce soil erosion. Therefore, the effects on water quality would be negligible.

Ending grazing in the Montezuma allotment and continuing it in the Joe's Spring allotment would result in adverse effects on water quality similar to those described for alternative A; however, there would be offsetting beneficial effects from ending grazing in the Montezuma allotment. As in the no-action alternative, the impacts would be partially mitigated by the actions of the *Livestock Management Plan:* resting pastures every three years, controlling water sources, using salt blocks, and using an adaptive management approach. The long-term adverse effects on water quality from grazing would be minor.

Cumulative Effects. As in alternative A, recreation, cattle grazing, ranching, road construction, water diversion, and urban development in the region all cumulatively affect soils, vegetation, and riparian environments, and consequently water quality.

Livestock grazing in riparian areas in upland communities would continue to affect water quality downstream on a reduced basis by reducing water infiltration and increasing runoff, erosion, sedimentation, and turbidity. The compaction of soils in grazed areas would continue to lead to reduced water infiltration and increased runoff, erosion, and sediment delivery to streams.

Continued grazing in the national memorial, even though grazing would be eliminated from one allotment, would contribute cumulatively to adverse effects on water quality. However, with the *Livestock Management Plan* in use, the effects of grazing in the memorial would be minimal in relation to other development and agricultural activities in the area. The effects on soils, vegetation, and riparian habitat in the memorial resulting from the actions of alternative D would add little to the regional cumulative effects on water quality compared to the disturbance occurring in other parts of the region.

Both allotments in the national memorial drain into the San Pedro River in either the United States or Mexico. The Arizona Department of Environmental Quality monitors water quality in the San Pedro River at a station approximately 9 miles east of the memorial and less than 4 miles north of the international boundary. The Environmental Protection Agency has classified portions of the San Pedro River between the Mexico border and Charleston Arizona as impaired under section 303d of the Clean Water Act because of turbidity levels that exceed water quality standards (AZ Dept. of Env. Qual. 1998). Over five years, 10%–25% of the samples taken exceeded the turbidity standard for the designated uses of aquatic life, wildlife, full body contact, and agriculture irrigation/ livestock water. However, the sources have been attributed to natural processes and grazing outside Arizona's jurisdiction.

The paths that have been created near the smuggling route for undocumented aliens and

illegal drugs would continue to adversely affect riparian habitats through trampling of vegetation and increased erosion. This, coupled with the adverse impacts from grazing, would continue under alternative A, cumulatively affecting riparian habitat and consequently water quality.

Developing additional employee housing in the memorial would not contribute to the cumulative effects of these other activities occurring in the region.

Conclusion. No adverse effects on water quality would be anticipated from developing additional employee housing. The establishment of monitoring programs in the memorial to monitor activities such as grazing would benefit overall water quality in the memorial.

Expanding the visitor center and adding picnic sites in previously disturbed areas would result in negligible to minor effects on water quality because the development would not take place in riparian habitat or near drainages. Mitigating measures would minimize erosion and limit construction to the immediate area.

Removing the Montezuma Ranch structures and replacing them with new buildings or adapting them for use as an educational center would not affect water quality.

Paving East Forest Lane and developing trails would result in short-term minor adverse impacts on water quality because construction would increase soil erosion and sedimentation. The long-term impacts would be negligible because riparian vegetation would recover along the streambank.

Continuing grazing in the Joe's Spring allotment would continue to affect water quality adversely through continued streambank erosion and sedimentation, but ending grazing in the Montezuma allotment would offset these effects.

Wildlife

Analysis. Through knowledge gained from an inventory and monitoring program, national memorial staff could better protect wildlife habitat. Educating the public with interpretive materials could reduce impacts on wildlife and habitat from visitor use. Overall, developing interpretive programs would result in a beneficial effect on wildlife.

New employee housing would affect wildlife in that mobile animals would move during development to similar adjacent habitats, and slow or sedentary animals such as some reptiles, amphibians, and small mammals might be lost. For animal species that are common in the memorial, the construction would have negligible adverse effects. The rare or uncommon species that are slow or sedentary, particularly amphibians and reptiles, would be more susceptible to adverse effects from construction. However, with mitigating measures to reduce the potential loss of individuals of rare or uncommon species, the long-term adverse effects on wildlife would be negligible to minor.

Expanding the visitor center and adding picnic sites in previously disturbed areas would result in effects on wildlife similar to those described for alternative B.

Paving parking areas and building a paved road to Montezuma Ranch would result in the loss of wildlife habitat and individuals, but the areas affected would be small; therefore, the adverse effects would be negligible.

Rebuilding and paving East Forest Lane could result in increased human presence, possibly preventing migrating species, particularly predators, from using the area. The drainage that the road crosses represents the best potential conduit for wildlife from the Huachuca Mountains. Roads can significantly affect wildlife demographics and movements, can cause loss of habitat, and can have detrimental effects on large animals through road kill and avoidance behaviors that fragment

populations (Trombulak and Frissel 2000). Indirect effects can include more human access into areas, which further exacerbates the effect of the roads (Hass 2000). Therefore, paving this road, which would bring more visitors into the area, would result in long-term minor adverse effects on wildlife populations.

Developing four new trails in the grassland would result in impacts similar to those described for alternative B. Wildlife would be disturbed, but the long-term adverse effects would be negligible to minor because only a small portion of available wildlife habitat in the memorial would be disturbed.

Some benefits to individual animals in the memorial might result from trail and road development. Animals such as mule deer and white-tailed deer might use the trails and roads to facilitate movement within the habitat. Ease of movement might benefit individuals of those species by reducing energy expenditures. The long-term benefits would likely be negligible.

Removing the existing Montezuma Ranch structures and building an educational center would adversely affect wildlife in ways similar to the effects of removing the ranch structures described for alternative A. Adapting the existing structures for use as the educational center would result in fewer impacts on wildlife in the immediate area than would the construction of a new center. The local adverse effects on wildlife would be negligible.

Continuing grazing in the Joe's Spring allotment and ending grazing in the Montezuma allotment would reduce the area grazed by 14%, increasing grassland habitat and forage. This would benefit wildlife, particularly small mammals and their predators. The reduced impacts on riparian vegetation would increase cover and nesting habitat, benefiting such species as migrating birds, deer, and predators because the drainages in the allotment are used as wildlife corridors. The long-term beneficial effects on the national memorial's wildlife would be minor.

Cumulative Effects. Developments by the border patrol to improve roads and install fencing and lighting adversely affect wildlife by impeding movement, altering feeding patterns, and reducing habitat quality for nesting and feeding. Development, grazing, and loss of habitat in areas adjacent to the national memorial and in the San Pedro River valley might result in the loss of more wildlife species from the memorial. Timber harvesting and hunting in the adjacent Coronado National Forest would reduce available wildlife habitat, alter animal behaviors, and results in the removal of individuals. Although thought to be rare in the memorial, poaching of reptiles and amphibians results in a loss of individuals and may reduce populations of rare or uncommon species in the region. Development within the national memorial including new employee housing which would result in the loss of a small portion of wildlife habitat would contribute negligibly to the adverse cumulative effects of these other regional activities.

As described in alternative B, grassland restoration in Fort Huachuca is being used to improve the ecological integrity and function of native grasslands, and prescribed burning on private and public lands in the area is used to maintain grasslands. The actions of alternative D would contribute cumulatively to these regional beneficial effects on grasslands except that one grazing allotment would remain active.

As described in alternative B, in combination with forest conservation actions in the isolated mountains of southeastern Arizona and in the San Pedro River National Conservation Area, the actions of alternative D would benefit both migratory birds and larger, dispersing animals that require more forest habitat to sustain viable populations. The Upper San Pedro Valley is a major neotropical migrant bird corridor. Woodlands and forest habitats in the Huachuca

Mountains and in the San Pedro River National Conservation Area are important habitat resources for migrating birds.

Conclusion. Programs to interpret, document, and inventory memorial resources and uses would result in a long-term negligible benefits on threatened and endangered or sensitive species in the memorial. Loss of a small portion of wildlife habitat and the potential for loss of sedentary individual animals from development of new employee housing would have long-term negligible to minor adverse effects.

The adverse effects on wildlife from expanding the visitor center and adding picnic sites in previously disturbed areas would be negligible to minor. Removing the Montezuma Ranch structures and using mitigative measures to reduce impacts on rare or uncommon species would result in long-term negligible adverse effects on wildlife. Developing trails in the memorial would result in short-term adverse effects on wildlife, but the effects would be negligible to minor because the areas affected would be small. Trails and roads might benefit some species by facilitating movement.

Widening and paving East Forest Lane road, with the resultant increased visitor access, would cause long-term minor adverse local effects on wildlife from increased potential for roadkill and the continued fragmentation of habitat. These actions also would degrade the value of the drainages as migration corridors. Ending grazing in the Montezuma allotment would increase grassland forage and improve riparian habitat, resulting in long-term minor beneficial effects for wildlife.

Impairment

The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, alternative D would not result in any impairment of resources or values related to air quality; cave resources, soils; vegetation; threatened, endangered, or sensitive species; water quality; or wildlife.

ALTERNATIVE E

Air Quality

Analysis. Dust and construction equipment emissions would be produced under alternative E from revegetation, trail improvements, and the construction of a new visitor center. The effects from these actions on local air quality would be transient, short-term and local, but they could be noticeable to visitors and NPS staff. The short-term adverse effects on local air quality would be negligible to minor. None of these activities would affect regional air quality.

Traffic emissions from vehicles would increase with growing visitation, but the memorial would continue to meet all applicable air quality criteria. The changes in emissions would result in negligible short-term adverse effects. Other plans and management activities of the national memorial would not adversely affect air quality.

Cumulative Effects. Population growth and development outside the national memorial would be more likely to affect air quality than the management activities of the memorial. In addition, emissions from Tucson and Mexico are carried to the memorial by prevailing winds. Alternative E, in conjunction with other actions, would contribute negligibly to short-term local adverse effects on air quality but would not affect regional air quality.

Conclusion. The construction activities and increased traffic from more visitation in alternative E would cause negligible local short-term adverse effects on local air quality at the memorial but would not affect regional air quality.

Cave Resources

Analysis. There are a number of caves in the national memorial, with Coronado Cave being the most prominent and accessible (0.75 mile from the visitor center). This has resulted in a visitation, by permit, of between 5% and 6% of the people that currently come to the memorial. The cave contains various limestone formations (stalactites, stalagmites, flowstone, and helicites) and provides habitat for animals. Occasionally visitors might cause slight damage to cave resources. In any one year, the damage results in negligible to minor adverse effects on cave resources. Developing a carrying capacity for Coronado Cave would result in the establishment of a monitoring system that would measure any loss of cave resources so that corrective measures could be taken. However, the loss of resources year after year could eventually result in minor long-term adverse effects on cave resources.

Cumulative Effects. The opening of Kartchner Caverns State Park about 35 miles north of the memorial has increased the interest of the visitors in caves. This interest added to the accessibility of Coronado Cave has resulted in a slight increase in visitation to the memorial's cave. This increased interest in caves has resulted in a slight loss of sensitive cave resources in the area of Cochise County.

Conclusion. There would be beneficial effects on Coronado Cave. The intensity of these effects would be difficult to quantify before the carrying capacity is determined, but the effects would be long term and probably would be negligible to minor.

Soils

Analysis. Building a new visitor center and a hardened parking area in the area now occupied by the Joe's Spring allotment (in the grassland area about 1 mile north of the main road) would result in soil erosion and compaction. The land where the visitor center would be developed has been grazed previously, and the grassland habitat where the facilities would be built has a low potential for soil erosion. Ground disturbance would be concentrated north of the main road. About 10% of these actions would take place in previously disturbed areas and 90% would occur in undisturbed areas.

Removing vegetation or surface layers or compacting soils to prepare for the development would result in negligible to minor short-term and long-term adverse impacts on soils, which would be lessened by the use of mitigative measures to minimize erosion and limit construction activities to the immediate area.

Widening and paving Windmill Road to accommodate large vehicles and creating a hardened parking area near the new visitor center would compact the soils and reduce soil permeability. This would result in more surface runoff, which would make adjacent slopes more vulnerable to erosion. Paving the part of Windmill Road that parallels a dry streambed might increase the amount of soil eroded along the stream channel, resulting in higher rates of stream sedimentation. The short-term and long-term adverse impacts on soils from these actions of alternative E would be negligible to minor.

In alternative E, establishing a program to inventory, document, and interpret natural resources in the memorial would improve the memorial staff's ability to protect soil resources. Developing more interpretive materials and programs would help the public understand the memorial's resources of the memorial and the impacts associated with human activity. This understanding could

facilitate NPS efforts to reduce visitors' effects on soil resources such as the creation of social trails or paths. Overall, a long-term negligible beneficial effect on soils could result from these programs.

Adding new employee housing in the current residential area north of the visitor center could lead to a loss of soils from erosion and compaction. However, the area affected would be small (less than 1 acre). Soils that have been excavated and/or covered by impervious surfaces such as roads, parking lots, or buildings may lack typical physical, biological, and chemical properties. Therefore, the long-term adverse impacts of this development on soils would be negligible to minor, and mitigative measures would be used to minimize erosion and to limit construction activities to the immediate area.

Developing three new trails in the grassland areas would disturb or remove vegetation, resulting in effects on soils similar to those described for trail development in alternative D.

Removing the Montezuma Ranch structures and restoring the area would result in beneficial effects on soils similar to those described for alternative A.

Ending grazing in the Joe's Spring allotment and continuing grazing in the Montezuma allotment (668 acres, or 14% of the national memorial) would result in impacts similar to those described for alternative A. However, allowing grazing on only one allotment would reduce by 25% the area of the national memorial grazed compared to the no-action alternative. The local long-term adverse impacts on soils from grazing would be minor, and they would be offset by the minor beneficial effects from ending grazing in the Joe's Spring allotment. As under the no-action alternative, the effects would be partially mitigated by resting the pastures once every three years, and the use of riparian areas would be mitigated by controlling water sources, using salt blocks, and following an adaptive management approach.

Cumulative Effects. Similar to alternative A, because the national memorial is on a smuggling route for undocumented people and illegal drugs, such use has resulted in the creation of many footpaths, especially along drainages. The construction of a fence by the U.S. Border Patrol at the United States–Mexican border might funnel foot traffic westward into the memorial, which would create more footpaths, degrading soils and vegetation. In addition, soils in the memorial would be affected to a negligible degree by visitor use of trails and picnic areas. Soil compaction and erosion would occur along existing trails and by the creation of social trails. Similar effects result from the development of game trails by wildlife in the area. These activities, along with the activities associated with the no-action alternative, would result in minor adverse impacts on soils throughout the national memorial.

The efforts by the National Park Service to educate the public about the natural environment would support other local and regional entities' efforts to conserve and enhance the protection of natural resources in the area. Programs within the region including the memorial would enhance public awareness of the natural environment, which would benefit all natural resources.

Conclusion. Developing a new visitor center under alternative E would result in ground disturbance, which would cause local short-term and long-term adverse effects on soils. These effects would be negligible to minor because the area affected would be small and mitigating measures would be used. Paving roads, adding parking areas, and developing trails would result in short-term and long-term negligible to minor adverse effects on soils. Those short-term effects would diminish over time with the recovery of vegetation along the road.

Removing the Montezuma Ranch structures would result in short-term negligible to minor adverse impacts on soils, which would be offset by long-term beneficial effects from

restoring and revegetating the site, which would improve soils by reducing compaction and increasing permeability. This would result in local long-term negligible to minor beneficial effects.

The development of new employee housing would result in long-term negligible to minor adverse effects on soils, and mitigation measures would be employed to reduce erosion. Programs to interpret, document, and inventory memorial resources and uses would result in long-term negligible benefits to soils in the memorial.

Continuing grazing in the Montezuma allotment (14% of the national memorial) would result in minor long-term adverse impacts on soils, but they would be offset by eliminating grazing from the Joe's Spring allotment.

Vegetation

Analysis. Building a new visitor center and a hardened parking area in the area now occupied by the Joe's Spring allotment would result in soil erosion and compaction on previously grazed land. The soil erosion potential is low in the grassland where the facilities would be built. The ground disturbance would be concentrated north of the main road. About 10% of these actions would take place in previously disturbed areas and 90% would occur in undisturbed areas.

Removing vegetation or surface layers or compacting soils to prepare for the development would adversely affect vegetation, which would be lessened by the use of mitigative measures to minimize erosion and limit construction activities to the immediate area. Those adverse impacts on vegetation would be negligible to minor with the use of mitigating measures.

Widening and paving Windmill Road to accommodate large vehicles and creating a hardened parking area near the new visitor center would result in the trampling and uprooting of plants and compact the soils, reducing soil permeability. Paving the part of Windmill Road that parallels a dry streambed might increase the amount of soil eroded along the stream channel, resulting in higher rates of stream sedimentation.

The local short-term adverse effects on vegetation (similar to those described for alternative D) would be negligible to minor because the area affected would be small and best management practices would be followed to reduce their intensity. The effects would diminish over time as vegetation along the road recovered.

Establishing a program to inventory, document, and interpret natural resources in the memorial would improve the memorial staff's ability to protect vegetation. Developing more interpretive materials and programs would help the public understand the memorial's resources of the memorial and the impacts associated with human activity. This understanding could facilitate NPS efforts to reduce visitors' effects on vegetative communities such as the creation of social trails. Overall, a long-term negligible beneficial effect on vegetation could result from these programs.

Adding new employee housing in the current residential area north of the visitor center could lead to a loss of vegetation from erosion and compaction as well as from the uprooting and loss of individual plants. However, the area affected would be small (less than 1 acre). Soils that have been excavated and/or covered by impervious surfaces such as roads, parking lots, or buildings may lack typical physical, biological, and chemical properties. Therefore, the long-term adverse impacts of this development on vegetation would be negligible to minor, and mitigative measures would be used to minimize erosion and to limit construction activities to the immediate area.

Developing three new trails in the grassland areas would disturb or remove vegetation, re-

sulting in effects on soils and vegetation similar to those described for trail development in alternative D.

Removing the Montezuma Ranch structures and restoring the area would result in beneficial effects on vegetation similar to those described for alternative A.

Eliminating grazing from the Joe's Spring allotment and continuing grazing in the Montezuma allotment (668 acres, or 14% of the national memorial) would result in impacts similar to those described for alternative A, but the area grazed would be reduced by 25% compared to alternative A. The local long-term adverse impacts on vegetation in the memorial from grazing would be minor, and they would be offset by the minor beneficial effects of ending grazing in the Joe's Spring allotment. As under the no-action alternative, the effects would be partly mitigated by resting the pastures once every three years, and the use of riparian areas would be mitigated by controlling water sources, using salt blocks, and following an adaptive management approach. The effects on range condition would be similar to those described for alternative D, but the area affected would be slightly (11%) smaller.

Cumulative Effects. The encroachment of woody species throughout grasslands in the upper San Pedro Basin is a factor in regional decreases in the amount and ecological functioning of native grasslands and in their fragmentation into small, disconnected patches. Urban development in the region also has resulted in a loss of grassland acreage. Another regional issue is the intrusion of nonnative plant species. Fort Huachuca and Coronado National Forest are trying to prevent the introduction of such species and control their spread. Fort Huachuca is conducting experimental investigation and treatments of Lehmann lovegrass. Ending grazing in the national memorial would benefit the grassland habitat, and restoring native species under alternative B would benefit vegetation. However, the actions of alternative B would not offset the loss of grasslands from development or the invasion of nonnative plants in the region, and implementing the alternative would contribute little cumulatively to regional effects.

Coronado National Memorial is on a smuggling route for undocumented people and illegal drugs. The illegal entry across the United States border into the memorial has resulted in soil compaction and erosion resulting from the development of numerous footpaths. In addition, vegetation in the memorial would be affected to a negligible degree by visitor use of trails and picnic areas. Visitor use results in soil compaction and erosion along existing trails and the creation of social trails, which results in uprooting and damage to vegetation in the local area. These activities, along with the development of additional employee housing, would result in negligible to minor adverse impacts on soils throughout the national memorial.

The efforts by the National Park Service to educate the public about the natural environment would support other local and regional entities' efforts to conserve and enhance the protection of natural resources in the area. Programs within the region including the memorial would enhance public awareness of the natural environment, which would benefit all natural resources.

Conclusion. Developing a new visitor center would cause ground disturbance, which would lead to local short-term and long-term adverse effects on vegetation. These effects would be negligible to minor because the area affected would be small and mitigating measures would be used. Paving roads, adding parking areas, and developing trails would result in short-term and long-term negligible to minor adverse impacts on grassland vegetation. Those short-term effects would diminish over time as vegetation along the road recovered.

The development of new employee housing would result in long-term negligible to minor

adverse effects on vegetation, and mitigation measures would be employed. Programs to interpret, document, and inventory memorial resources and uses would result in long-term negligible benefits to vegetation in the memorial.

Removing the Montezuma Ranch structures would result in short-term negligible to minor adverse impacts on vegetation. This would be offset by long-term beneficial effects from restoring and revegetating the site, which would reduce compaction and increase permeability, resulting in local long-term negligible to minor beneficial effects.

Continuing grazing in the Montezuma allotment (14% of the memorial) would result in minor long-term adverse impacts on vegetation, but they would be offset by eliminating grazing from the Joe's Spring allotment.

Threatened, Endangered, or Sensitive Species

Analysis. The knowledge gained through establishing an inventory program would enable NPS personnel to better protect sensitive resources such as threatened and endangered species. Educating the public through new interpretive materials could help to reduce the adverse impacts on resources that sensitive species rely on. Overall, developing interpretive programs would result in a beneficial effect on threatened, endangered, or sensitive species.

About 90% of the development in alternative E — a new visitor center, parking areas, trails, and paving Windmill road — would be carried out in previously undisturbed areas and 10% in previously disturbed areas. These activities would result in indirect effects on lesser long-nosed and Mexican long-tongued bats and loggerhead shrikes by disturbing their prey base. Development also would cause the loss of habitat and food for small mammal species that serve as prey for the loggerhead shrike and might displace individuals of these prey species, but it is not likely that there would be a change in the overall availability of prey for the shrike.

With mitigation to transplant agaves in construction sites to prevent the loss of important food sources for nectar-feeding bats, the development activities of alternative E would not alter the population of agave plants, and the effects on the memorial's overall agave population would be negligible to minor. Development would affect an area smaller than 5 acres (less than 1% of the memorial's total acreage); therefore, alternative E might indirectly affect the lesser long-nosed and Mexican long-tongued bats and the loggerhead shrike but would not be likely to adversely affect these species. Because the area where the development would occur is not in prime owl foraging or nesting habitat, these activities would not be likely to adversely affect the Mexican spotted owl.

Removing the Montezuma Ranch structures, restoring the area's natural contours, and revegetating it would result in effects on sensitive species similar to those described for alternative A.

Ending grazing in the Joe's Spring allotment and continuing grazing in the Montezuma allotment (a 25% reduction in area compared to the no-action alternative) would continue to affect vegetation that serves as habitat and cover for loggerhead shrikes. It would have a negligible effect on nectar-feeding bats. Continued grazing on the Montezuma allotment would not be likely to adversely affect the lesser long-nosed bat.

Because suitable nesting and foraging habitat for the Mexican spotted owl is lacking in the Montezuma allotment, it is unlikely that the owls use that allotment. Continued grazing on the Montezuma allotment under alternative E might affect, but would not be likely to adversely affect, the Mexican spotted owl.

Cumulative Effects. Efforts by the National Park Service to educate the public about the natural environment would support other local and regional entities' efforts to conserve and enhance the protection of natural resources in the area. Natural areas adjacent to the memorial such as the national forests, the national conservation area, and state parks offer interpretive programs and provide visitor information related to the unique natural environment found in the region. These programs along with enhanced interpretation and inventorying of memorial resources that enhance public awareness and understanding of the natural environment would benefit all natural resources.

A loss of trees in the memorial and the resultant growth of high elevation grasses since the wildfires of 1988 have resulted in an increase in rodent species, which has increased the availability of prey for the loggerhead shrike, a minor beneficial effect for the shrikes and their prey. Eliminating some grazing under alternative E would increase grassland habitat and small mammal habitat, which would increase the prey abundance for the shrike. Ending some grazing in the memorial, combined with the effects of the past fire, would result in a minor cumulative benefit to the loggerhead shrike.

As has been mentioned, wildfire is the primary threat to the persistence and recovery of the Mexican spotted owl (USFWS 1995b). The loss of owl habitat in the memorial from the 1988 wildfire, together with the potential for future catastrophic fire, represents a moderate to major threat to this species. Limiting the removal of powerlines in the proposed protected activity center to a time not in the owl's breeding season would cause negligible effects on the species. This activity, combined with habitat loss from wildfire, would cause moderate to major effects on the Mexican spotted owl. Actions to reduce hazardous fuel loads in Coronado National Forest, which would be identified in a future fire management plan and are currently underway on Fort Huachuca, would cumulatively benefit the owls by reducing the likelihood of habitat alteration.

The restoration of grassland on Fort Huachuca is improving the ecological integrity and function of native grasslands. Prescribed burns on private and public lands are being used to maintain grasslands, which might increase the region's agave population, a minor to moderate benefit for nectar-feeding bats in the region. Alternative C would make a negligible contribution to these beneficial effects on grasslands and nectar-feeding bats. The overall beneficial cumulative effect on listed and sensitive bat species in the region would range up to moderate.

Conclusion. Programs to interpret, document, and inventory memorial resources and uses would result in a long-term negligible benefits to threatened and endangered or sensitive species in the memorial.

The ground-disturbing activities of developing buildings and trails and more road access into grasslands north of the main road would disturb vegetation and small mammals and reptiles. This would indirectly affect the lesser long-nosed bat, the Mexican long-tongued bat, and the loggerhead shrike, but it is unlikely that these species would be adversely affected.

The activities and developments of alternative E would take place in areas unsuited for Mexican spotted owl nesting and foraging habitat; therefore, implementing alternative E might affect, but would be unlikely to adversely affect, the Mexican spotted owl.

Removing the Montezuma Ranch structures and restoring and revegetating the area would result in more habitat for agave plants and more ground cover and habitat for small rodent species. This would indirectly benefit nectar-feeding bats and loggerhead shrikes by increasing their available food.

Restoring and revegetating the ranch area after removing the structures might increase the number of agave plants, resulting in more available food for nectar-feeding bats. Revegetating the area probably would increase the habitat and prey species of the loggerhead shrikes. Thus, there would be beneficial effects on the lesser long-nosed and Mexican long-tongued bat and the loggerhead shrike, and the restoration would not be likely to adversely affect these species. Because only a small part the memorial would be affected, this alternative might affect the lesser long-nosed and Mexican long-tongued bats and the loggerhead shrike but would not be likely to adversely affect these species.

It is unlikely that Mexican spotted owls use the grazing allotments. Therefore, gazing associated with this alternative would not be likely to adversely affect this species.

Continuing grazing in the Montezuma allotment would continue negligible to minor adverse effects on vegetation and wildlife on which listed or sensitive species rely for food and habitat. Implementing alternative E would not be likely to adversely affect the lesser long-nosed bat.

Continuing grazing in the Montezuma allotment would continue negligible to minor adverse effects on vegetation and wildlife on which listed or sensitive species rely for food and habitat.

Water Quality

Analysis. Better protection of soils and vegetation through a monitoring program would lead to better protection of water quality, an overall beneficial effect on water quality under this alternative. Developing new employee housing would not affect riparian habitat, and mitigative measures would include actions to minimize erosion by stabilization with structures or vegetation. Therefore, there would be no adverse impact on water quality from building new housing.

Developing a new visitor center would remove vegetation, resulting in soil erosion and compaction in the immediate area of development. This would not be done in a riparian area, and erosion into any nearby drainages would be mitigated by the use of structures or vegetation. Therefore, the adverse effects on water quality would be negligible. Adding parking for recreational vehicles and buses would result in effects on water quality similar to those described for alternative C.

Expanding and paving Windmill Road and creating a hardened parking area would compact the soils and reduce soil permeability, leading to more surface runoff, which would make slopes more vulnerable to erosion. Paving the part of Windmill Road that parallels and traverses a stream channel might increase erosion into the channel, causing higher rates of stream sedimentation, which could cause short-term adverse effects on water quality. Those impacts would be minor, and there would be fewer long-term adverse effects on water quality because vegetation along the stream channel would recover.

Developing three new trails in grassland areas might affect water quality if the trails crossed drainages. Such trail development would lead to increased streambank erosion and sedimentation. The short-term and long-term adverse effects of new trail development on water quality would be negligible to minor because the trails would be in previously disturbed areas, and the areas affected would be small.

Removing the Montezuma Ranch structures and restoring and revegetating the area would result in effects similar to those described for alternative A.

Continuing grazing in the Montezuma allotment would result in long-term minor adverse impacts on water quality similar to those described for alternative A; however, there would be offsetting beneficial effects

from ending grazing in the Joe's Spring allotment. The adverse impacts from grazing would be partially mitigated by resting the pastures once every three years, controlling water sources and salt blocks, and using an adaptive management approach.

Cumulative Effects. Recreation, cattle grazing, ranching, road construction, water diversion, and urban development in the region all cumulatively affect soils, vegetation, and riparian environments, and consequently water quality.

Livestock grazing in riparian areas in upland communities would continue to affect water quality downstream on a reduced basis by reducing water infiltration and increasing runoff, erosion, sedimentation, and turbidity. The compaction of soils in grazed areas would continue to lead to reduced water infiltration and increased runoff, erosion, and sediment delivery to streams.

Continuing some grazing in the national memorial would contribute cumulatively to adverse effects on water quality. However, with the *Livestock Management Plan* in use, the effects of grazing in the memorial would be minimal in relation to other development and agricultural activities in the area. The effects on soils, vegetation, and riparian habitat in the memorial resulting from the actions of alternative E would add little to the regional cumulative effects on water quality compared to the disturbance occurring in other parts of the region.

Both allotments in the national memorial drain into the San Pedro River in either the United States or Mexico. The Arizona Department of Environmental Quality monitors water quality in the San Pedro River at a station approximately 9 miles east of the memorial and less than 4 miles north of the international boundary. The Environmental Protection Agency has classified portions of the San Pedro River between the Mexico border and Charleston Arizona as impaired under section 303d of the Clean Water Act because of turbidity levels that exceed water quality standards (AZ Dept. of Env. Qual. 1998). Over five years, 10%–25% of the samples taken exceeded the turbidity standard for the designated uses of aquatic life, wildlife, full body contact, and agriculture irrigation/livestock water. However, the sources have been attributed to natural processes and grazing outside Arizona's jurisdiction.

The paths that have been created near the smuggling route for undocumented aliens and illegal drugs would continue to adversely affect riparian habitats through trampling of vegetation and increased erosion. This, coupled with the adverse impacts from grazing, would continue under alternative E, cumulatively affecting riparian habitat and consequently water quality.

Conclusion. No adverse effects on water quality would be anticipated from developing additional employee housing. The establishment of monitoring programs in the memorial to monitor activities such as grazing would benefit overall water quality in the memorial.

The long-term effects on water quality from developing a new visitor center would be negligible because the development would not take place in a riparian area or along drainages, and mitigative measures would reduce soil erosion.

Removing the Montezuma Ranch structures and restoring and revegetating the area would result in negligible long-term beneficial effects on water quality.

Paving Windmill Road would result in minor long-term adverse impacts on water quality because the amount of stream channel affected would be small. Road and trail development would result in negligible to minor long-term adverse impacts on water quality.

Continuing grazing in the Montezuma allotment would result in minor long-term

adverse impacts on riparian habitats and consequently on water quality, but the effects would be offset by eliminating grazing in the Joe's Spring allotment.

Wildlife

Analysis. Through knowledge gained from an inventory and monitoring program, national memorial staff could better protect wildlife habitat. Educating the public with interpretive materials could reduce impacts on wildlife and habitat from visitor use. Overall, developing interpretive programs would result in a beneficial effect on wildlife.

New employee housing would affect wildlife in that mobile animals would move during development to similar adjacent habitats, and slow or sedentary animals such as some reptiles, amphibians, and small mammals might be lost. For animal species that are common in the memorial, the construction would have negligible adverse effects. The rare or uncommon species that are slow or sedentary, particularly amphibians and reptiles, would be more susceptible to adverse effects from construction. However, with mitigating measures to reduce the potential loss of individuals of rare or uncommon species, the long-term adverse effects on wildlife would be negligible to minor.

Developing a new visitor center about 1 mile north of the main road would not affect any rare or uncommon species, which do not inhabit that area, according to national memorial surveys. Construction would compact soils and remove vegetation, which would result in the loss of habitat and foods for wildlife, but the short-term adverse effects on wildlife would be negligible because the affected area would be small.

Widening and paving Windmill Road would adversely affect wildlife in ways similar to those described for East Forest Lane in alternative D. Developing two new trails in the grassland north of the main road would cause negligible effects on wildlife; no rare or uncommon species are known to inhabit this area. However, wildlife would be adversely affected by increased human presence made possible by the access to the new visitor center, the paved road, and the new trails. There has been little previous human use of this habitat, and the presence of people and vehicles would cause animals to use more energy, so increased road access might cause the loss of individual animals and the fragmentation of populations. Thus, these developments in previously undisturbed areas would result in a loss of habitat value, but the area is small and does not contain uncommon species, so the adverse effects of alternative E on wildlife would be negligible to minor. Some benefits to individual animals in the memorial might result from trail and road development by facilitating movement within the memorial, which might reduce individual animal's energy expenditure. The long-term benefits to wildlife from these developments would likely be negligible.

As in alternative B, removing the Montezuma Ranch structures and restoring and revegetating the area would result in more ground cover and habitat for small rodent species. The structure removal would cause short-term negligible adverse effects on wildlife. Mitigating measures would be used to prevent or reduce the effects on rare or uncommon wildlife species. Restoring and revegetating the site with native vegetation after the structures were removed would offset the adverse impacts on soils and improve grassland habitat, benefiting wildlife species.

Eliminating grazing from the Joe's Spring allotment and continuing it in the Montezuma allotment (reducing the area grazed in the memorial by 25%) would increase grassland habitat and forage for wildlife, particularly benefiting small mammals and their predators. The reduced effects on riparian vegetation from reduced grazing would increase cover and nesting habitat, benefiting such species as migrating birds, deer, and predators that use drainages as wildlife corridors. The long-term

effects on wildlife in the national memorial would be minor.

Cumulative Effects. A fence built by the U.S. Border Patrol at the southern edge of Coronado National Memorial, newly installed lighting, and improvements to the dirt road there would have the potential to affect wildlife migration, access to water, and the movements of nocturnal species in local areas. Changes in the road would make travel at greater speeds possible, posing a threat to wildlife by collision. This project could adversely affect wildlife in the memorial, especially larger species adapted to moving over large tracts of land. Implementing alternative A would not contribute cumulatively to the adverse effects of the Border Patrol project.

Developments by the border patrol to improve roads and install fencing and lighting adversely affect wildlife by impeding movement, altering feeding patterns, and reducing habitat quality for nesting and feeding. Development, grazing, and loss of habitat in areas adjacent to the national memorial and in the San Pedro River valley might result in the loss of more wildlife species from the memorial. Timber harvesting and hunting in the adjacent Coronado National Forest would reduce available wildlife habitat, alter animal behaviors, and results in the removal of individuals. Although thought to be rare in the memorial, poaching of reptiles and amphibians results in a loss of individuals and may reduce populations of rare or uncommon species in the region. Development within the national memorial including new employee housing which would result in the loss of a small portion of wildlife habitat would contribute negligibly to the adverse cumulative effects of these other regional activities.

The efforts by the National Park Service to educate the public about the natural environment would support other local and regional entities efforts to conserve and enhance the protection of natural resources in the area. Programs within the region including the memorial that enhance public awareness of the natural environment help to protect sensitive areas such as riparian areas. Protection of these areas conserve wildlife habitat and benefit wildlife within the region.

As described in alternative B, grassland restoration in Fort Huachuca is being used to improve the ecological integrity and function of native grasslands, and prescribed burning on private and public lands in the area is used to maintain grasslands. The actions of alternative E would contribute cumulatively to these regional beneficial effects on grasslands except that one grazing allotment would remain active.

As described in alternative B, in combination with forest conservation actions in the isolated mountains of southeastern Arizona and in the San Pedro River National Conservation Area, the actions of alternative E would benefit both migratory birds and larger, dispersing animals that require more forest habitat to sustain viable populations. The Upper San Pedro Valley is a major neotropical migrant bird corridor. Woodlands and forest habitats in the Huachuca Mountains and in the San Pedro River National Conservation Area are important habitat resources for migrating birds.

Proposed management actions at Fort Huachuca and activities in the Coronado National Forest (such as snag and nest tree protection and wildfire management) would sustain biologically and structurally diverse habitat for migrating or dispersing wildlife in the Huachuca Mountains, as described in alternative B. The actions of alternative E would complement these efforts to maintain wildlife corridors and riparian areas and conserve native grasslands.

Conclusion. Programs to interpret, document, and inventory memorial resources and uses would result in a long-term negligible benefits on threatened and endangered or sensitive species in the

memorial. Loss of a small portion of wildlife habitat and the potential for loss of sedentary individual animals from development of new employee housing would have long-term negligible to minor adverse effects.

Developing buildings, trails, and roads under alternative E would result in the loss of habitat and individual animals and the fragmentation of populations. This represents a loss of habitat value, but because the affected grassland area would be small and does not contain uncommon species, the adverse effects on wildlife would be negligible. Trails and road development might benefit individuals of some species by facilitating movement.

Removing the Montezuma Ranch structures, with mitigation to reduce the adverse effects on rare or uncommon species, would result in long-term negligible adverse effects on wildlife. Restoring and revegetating the ranch area would improve grassland habitat, benefiting wildlife. Eliminating grazing from the Joe's Spring allotment would increase forage and habitat in grassland and riparian areas, a long-term beneficial effect for wildlife.

Impairment

The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of resources or values related to air quality; cave resources, soils; vegetation; threatened, endangered, or sensitive species; water quality; or wildlife would result from implementing alternative E.

UNAVOIDABLE ADVERSE IMPACTS

All the alternatives would result in adverse impacts on soils, with the level of impact varying at the site level. However, when the impacts on soils are compared to the size of the memorial, they would be negligible, because less than 1% of memorial soils would be affected in all alternatives.

Vegetation and soils would be removed when small areas were graded to build new facilities, expand existing structures, add parking lots and pullouts, or pave roads and develop trails. Alternatives B, C, D, and E would result in these unavoidable adverse effects with varying degrees, depending on the amount of development.

None of the alternatives would result in unavoidable adverse impacts on the endangered Mexican spotted owl or long-nosed bat, or on species of special concern, including the Mexican long-tongued bat and the loggerhead shrike.

Water quality would be adversely affected by development or by upgrading trails in alternatives B, C, and D. The loss of riparian vegetation and increased soil erosion in each of these alternatives would cause negligible to minor adverse impacts on water quality. Road construction in alternatives D and E would adversely affect water quality, but the effects would be negligible to minor because the areas affected would be small and mitigating measures would control erosion. Grazing in riparian habitats would continue to affect water quality in alternative A, and to a lesser extent in alternatives D and E, in which only one allotment would be grazed.

Construction would disturb wildlife species under all the action alternatives. Paving roads and parking areas under alternatives D and E would adversely affect wildlife. Developing a new visitor center in a previously undisturbed

grassland area (alternative E) would result in minor adverse effects on wildlife.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The erosion of soils that would result from developing facilities and trails, installing impervious surfaces, or removing Montezuma Ranch structures would be an irreversible loss because soils in this area form slowly.

RELATIONSHIPS OF SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

Developing trails, constructing visitor and operation facilities, and demolishing structures could cause short-term adverse impacts on soils when soils were exposed to wind or rain, resulting in higher rates of erosion. However, in the long term, restoring and revegetating sites in alternatives A, B, C, and E and eliminating some or all grazing from the memorial under alternatives B, C, D, and E would result in long-term saving of resources and enhance the preservation of soils. All the alternatives would result in long-term beneficial effects on soils, with the beneficial effects from alternative C being the greatest.

Developments or expanding and upgrading existing facilities would permanently remove vegetation. Vegetation also could be degraded by continuing grazing (alternatives A, D, and E) and by constructing new facilities or trails in previously undeveloped areas (alternatives B, D, and E). However, these effects would not result in the loss of long-term productivity of vegetation in the memorial. Although vegetation would be lost under all the alternatives, there would be no adverse impacts on agave populations or common small mammal species (which, if they were to occur, could adversely affect the productivity of lesser long-nosed bats, Mexican long-tongued bats, or loggerhead shrikes).

Short-term adverse impacts on water quality and riparian habitat could result from developing or upgrading trails (alternatives B, C, D, and E) or roads (alternatives D and E), when soils and vegetation in riparian habitats were disturbed. However, restoring and revegetating sites (alternatives A, B, C, and E) and eliminating some or all grazing from the national memorial (alternatives B, C, D, and E) would save resources and enhance the national memorial's water quality and the preservation of wetland resources in the long term.

Building a new visitor center in the grasslands under alternative E would permanently remove wildlife habitat. Developing roads and trails to provide access to areas previously little used by visitors would degrade wildlife habitat under alternatives B, D, and E.

ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

Building new structures would increase energy requirements. Long-term energy demands would be mitigated by designing all structures to be energy efficient. Alternatives D and E, with the most structures to be maintained and used, would result in the greatest energy requirements.

EFFECTS ON CULTURAL RESOURCES

ALTERNATIVE A

Archeological Resources

Analysis. A series of archeological surveys has been and continues to be undertaken at the national memorial to meet the requirements of EO 11593. These surveys have identified prehistoric lithic scatter plots, isolated artifacts, and historic sites throughout the national memorial. These sites have not been completely evaluated, but NPS personnel continue to complete site research to identify and protect archeological features. These surveys and resource documentation are improving the national memorial's ability to make informed management decisions about the identification and location of archeological resources. The continuing identification and location of archeological resources would result in their being preserved in place, a negligible long-term beneficial effect.

Some archeological surveys of the 82-acre Montezuma Ranch have been completed in the orchards and the pool area. The area around the main ranch structures has been altered by ground-disturbing activities caused by the development of dude ranch facilities, working ranch structures, and a large modern residence now under construction. Other ground-disturbing activities in that area over the years have been the construction of roads and corridors for water and electrical utilities, as well as the planting of an orchard and various ornamental trees and shrubs. Coronado National Memorial would conduct an archeological survey of the area. The identification and location of any archeological resources in the ranch area would result in their being preserved in place, a negligible long-term beneficial effect.

Grazing on the two allotments (1,811 acres) has disturbed archeological sites by livestock. The recently implemented *Livestock Management Plan* (NPS 2000b) is reducing but will not eliminate disturbance to archeological sites by cattle. The continued disturbance of archeological sites by cattle would result in a long-term minor to moderate adverse impact on archeological resources.

Cumulative Effects. Cattle grazing, which began before the national memorial was established, continues to disturb surface archeological resources, affecting such resources in the memorial's land. Coronado National Forest plans to continue developing inventories to use in preserving and interpreting cultural resources. The Bureau of Land Management plans to protect and conserve cultural resources in the San Pedro Riparian National Conservation Area. Cochise County plans for increased growth in the Southern San Pedro Valley, with some restriction on the scale and density of the development. These actions, added to the limited scope of Coronado National Memorial's efforts in preservation and development, could result in long-term negligible beneficial effects on the area's archeological resources.

Conclusion. An archeological survey would be undertaken at the Montezuma Ranch. Research and resource documentation are improving the national memorial's ability to make informed management decisions. The ongoing efforts to identify and protect archeological resources would benefit archeological resources, but such resources would be adversely affected by the continuation of grazing. The overall result would be a long-term negligible adverse impact on the national memorial's archeological resources.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific

purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of archeological resources or values would result from implementing alternative A.

Section 106 Summary. Under the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5) addressing the criteria of effect and adverse effect, the National Park Service finds that the survey work and continuing preservation work of the national memorial under alternative A would have an effect that would not be adverse. All national memorial resources that have been determined eligible for nomination to the National Register of Historic Places (International Boundary Monuments 100, 101, and 102 and the Montezuma Pass road) would not be adversely affected by the actions of this alternative.

Historic Structures

Analysis. The Montezuma Ranch structures have not been evaluated for eligibility for listing on the National Register of Historic Places. The national memorial is consulting with the Arizona state historic preservation office about this, but a formal determination of eligibility has not been completed. The staff of the national memorial is gathering documentation to submit to the Arizona state historic preservation office so that a formal determination of eligibility can be completed for the ranch structures. After completion of the determination, the structures not eligible for listing would be torn down; this would result in no effect. The structures determined to be eligible, if any, would be stabilized and preserved, resulting in a long-term minor beneficial effect on archeological resources.

The existing visitor center has not been formally evaluated for its eligibility for national register listing, but its status as a "Mission 66" structure makes it potentially eligible. At present there are no plans to do anything other than routine maintenance on the visitor center. If any substantial work was to be done on the visitor center, the national memorial staff would undertake the determination of its national register eligibility. If it was determined not to be eligible, the work would result in no effect. If it was determined to be eligible, the structure would be preserved, resulting in a long-term minor beneficial effect.

Cumulative Effects. Before the Historic Preservation Act was passed in 1966, various mining and ranch structures on lands now in the national memorial were removed or neglected, but since the act was passed, the memorial has identified historic structures and now works toward their preservation. Coronado National Forest plans to continue developing inventories to use in preserving and interpreting cultural resources. The Bureau of Land Management plans to protect and conserve cultural resources in the San Pedro Riparian National Conservation Area. These actions, added to the limited scope of Coronado National Memorial's preservation efforts, could result in long-term negligible beneficial effects on the area's historic structures.

Conclusion. Before taking any action regarding the Montezuma Ranch structures, the national memorial staff would pursue a formal determination of the structures' eligibility for the National Register of Historic Places. Research and resource documentation are improving the national memorial's ability to make informed management decisions. The ongoing efforts to identify and preserve historic structures would benefit these resources. The overall result would be a long-term negligible to minor beneficial effect on the memorial's historic structures.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of resources or values related to historic structures would result from implementing alternative A.

Section 106 Summary. Under the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5) addressing the criteria of effect and adverse effect, the National Park Service finds that the survey work and continuing preservation work of the national memorial under alternative A would have an effect that would not be adverse.

Ethnographic Resources

Analysis. The national memorial staff would continue to develop inventories for ethnographic resources to understand and manage these resources. As areas for gathering acorns and other items important to the American Indian culture become scarce, the use of the national memorial by American Indians might increase. There would be no change in the way American Indian groups are accommodated at the memorial; therefore, the result would be a long-term negligible beneficial effect.

Under this no-action alternative, the current programs of the national memorial would continue. These programs lack depth and range; therefore, visitors would continue to receive a limited understanding and appreciation of the Indian and Hispanic viewpoints about the Coronado Expedition.

Cumulative Effects. Until recently, Coronado National Memorial has made no attempt to identify ethnographic resources; however, it is now in the process of identifying and protecting those resources. Cochise County plans for increased growth in the southern San Pedro Valley, but with guidelines on the scale, density, location, and type of development. However, growth might adversely affect ethnographic resources. The county has identified scenic corridors and conservation easement areas that could protect ethnographic resources. These actions, added to the limited scope of the national memorial's preservation efforts, could result in a long-term negligible adverse impact on the area's ethnographic resources.

Conclusion. American Indians would continue gathering items important to their culture on the national memorial's lands. The long-term minor beneficial effect from developing inventories for ethnographic resources would be partially offset by a lack of in-depth programs, resulting in an overall long-term negligible beneficial effect on ethnographic resources.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of ethnographic resources or values would result from implementing alternative A.

Cultural Landscapes

Analysis. The national memorial would continue routine maintenance activities on its facilities and infrastructure (roads, picnic

areas, housing, administrative and visitor facilities, buildings). No new structures, roads, or trails would be added under this no-action alternative, but old structures would be rehabilitated as funding became available. This would preserve any potential cultural landscapes. One of the three cultural landscapes has been formally evaluated — a level I cultural landscape inventory has been completed for the Montezuma Ranch. The present actions of the national memorial to provide only maintenance would result in a long-term beneficial effect on cultural landscapes.

An evaluation of abandoned mining areas (all sites considered one landscape) and the entire memorial viewshed would be completed in future years. However, it is recognized through legislation that the views from Montezuma Pass are important to the national memorial's mission. Construction in the memorial would be done in a way that would protect the views from Montezuma Pass. Outside the national memorial, development of various types in the United States and Mexico threatens to degrade the views from Montezuma Pass. As funding permitted, the national memorial's cultural landscapes would be identified, and treatment would be developed for the preservation of these landscapes. The preservation of the memorial's cultural landscapes would be a long-term minor beneficial effect.

A cultural landscape inventory has been completed at the 82-acre Montezuma Ranch. NPS cultural landscape experts have made a preliminary determination that the ranch's cultural landscape lacks integrity and would not meet the criteria for listing on the National Register of Historic Places. The national memorial is consulting with the Arizona state historic preservation office about this, but a formal determination of eligibility has not been completed for this site. The Montezuma Ranch structures, which can be seen from Montezuma Pass, are visually intrusive on views from the national memorial into Mexico. Removing the structures would result in a long-term minor beneficial effect on the views from Montezuma Pass.

Cumulative Effects. Coronado National Memorial has recognized the importance of the CCC roadwork from the past and is treating the Montezuma Pass road as a significant cultural landscape. Coronado National Forest plans to maintain and enhance visual resource integrity. Cochise County plans for increased growth in the southern San Pedro Valley, but with guidelines on the scale, density, location, and type of the development to lessen the visual impact. In addition, the county has identified scenic corridors and conservation easement areas. The Bureau of Land Management plans to protect and conserve cultural resources in the San Pedro Riparian National Conservation Area. These actions, added to the limited preservation efforts in the national memorial, could result in long-term negligible to minor beneficial effects on the region's cultural landscapes.

Conclusion. Until the Montezuma Ranch structures were removed, they would have short-term negligible adverse impacts on national memorial views. Development outside the national memorial could result in minor to moderate short-term and long-term adverse impacts on cultural landscapes.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of cultural landscapes would result from implementing alternative A.

Section 106 Summary. Under the regulations of the Advisory Council on Historic

Preservation (36 CFR 800.5) addressing the criteria of effect and adverse effect, the National Park Service finds that the activities of the national memorial under alternative A would have an effect on cultural landscapes that would not be adverse.

ALTERNATIVE B

Archeological Resources

Analysis. The ground-disturbing activities of alternative B — building an annex to the visitor center, adding parking facilities, developing new trails — would disturb little new area. Surveys have not found any archeological sites that could not be avoided in the areas of these developments, but currently unknown archeological resources could exist there. If archeological resources were found, actions would be taken to protect them (see "Mitigating Measures," p. 65). Building the annex to the visitor center would not affect archeological resources. At the beginning of design planning, further evaluation of the developments would be necessary, with archeological surveys of the areas selected for development. Based on these surveys, development would be designed not to affect archeological resources.

Eliminating grazing from the memorial (1,811 acres) would end the disturbances of archeological resources by cattle. Compared to the no-action alternative, this would result in a long-term minor beneficial effect on archeological resources.

The management prescriptions of alternative B, with more than 75% of the national memorial in the conservation prescription and 15 % in the education prescription, with development concentrated in previously disturbed areas, would cause little disturbance of archeological sites. These management prescriptions would result in long-term minor beneficial effects on archeological resources.

Cumulative Effects. Cattle grazing would continue to disturb surface archeological resources outside the memorial. Coronado National Forest plans to continue developing inventories and using them to preserve and interpret cultural resources. Cochise County plans for increased growth in the southern San Pedro Valley, with some restriction on the scale and density of the development. The Bureau of Land Management plans to protect and conserve cultural resources in the San Pedro Riparian National Conservation Area. These actions, added to the limited development that would take place in the national memorial under alternative B, could result in long-term negligible adverse impacts on archeological resources in the region.

Conclusion. New development in the national memorial under alternative B would be minor, taking place primarily in previously disturbed areas. The impacts on archeological resources would be partially or fully mitigated by sensitive siting and by designing facilities in relation to the resources. Ending grazing in the national memorial would help to conserve archeological resources. Therefore, alternative B would result in a long-term negligible to minor beneficial effect on archeological resources.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of archeological resources or values would result from implementing alternative B.

Section 106 Summary. Under the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5) addressing the criteria of effect and adverse effect, the National Park

Service finds that the activities of alternative B would not have an adverse effect on archeological resources. All national memorial resources that have been determined eligible for nomination to the National Register of Historic Places (International Boundary Monuments 100, 101, and 102 and the Montezuma Pass road) would not be adversely affected by the actions of alternative B.

Historic Structures

Analysis. A formal determination of eligibility for listing on the National Register of Historic Places has not been completed for the various Montezuma Ranch structures. The staff of the national memorial is consulting with the Arizona state historic preservation office about evaluating the structures for their eligibility. The staff is gathering documentation to submit to the Arizona state historic preservation office so that a formal determination of eligibility can be completed. Any structures found ineligible for listing would be torn down; this would result in no effect. The structures determined to be eligible, if any, would be stabilized and preserved, resulting in a long-term minor beneficial effect on this archeological resource.

The memorial's visitor center has not been formally evaluated for its eligibility for listing on the national register, but its status as a "Mission 66" structure makes it potentially eligible. The structure would be evaluated for eligibility before any rehabilitation work could begin. If it was found eligible, the rehabilitation and construction proposed in this alternative would be done in a way that would not adversely effect significant features and values.

Cumulative Effects. Before the Historic Preservation Act was passed in 1966, various mining and ranch structures on lands now in the national memorial were removed or neglected, but since the act was passed, the memorial has identified historic structures and now works toward their preservation. Coronado National Forest plans to continue developing inventories to use in preserving and interpreting cultural resources. The Bureau of Land Management plans to protect and conserve cultural resources in the San Pedro Riparian National Conservation Area. These actions, added to the limited scope of Coronado National Memorial's preservation efforts, could result in long-term negligible beneficial effects on the area's historic structures.

Conclusion. Before taking any action regarding the visitor center or the Montezuma Ranch structures, the national memorial staff would pursue a formal determination of the structures' eligibility for the National Register of Historic Places. Research and resource documentation are improving the national memorial's ability to make informed management decisions. The ongoing efforts to identify and preserve historic structures would benefit these resources. The overall result would be a long-term negligible beneficial effect on the national memorial's historic structures.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Therefore, no impairment of resources or values related to historic structures would result from implementing alternative B.

Section 106 Summary. Under the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5) addressing the criteria of effect and adverse effect, the National Park Service finds that the survey work and continuing preservation work of the

national memorial under alternative B would have an effect that would not be adverse.

Ethnographic Resources

Analysis. The emphasis on developing various partnerships for understanding the cultural impacts of the Coronado Expedition would add to the appreciation of ethnographic resources in the vicinity. Festival and events sponsored by the national memorial would help to foster appreciation and understanding of various cultures; the effects of this would reach beyond the national memorial's boundaries The memorial's educational and interpretive programs would promote the protection of tangible and intangible resources in the vicinity. These actions would result in a long-term moderate to major beneficial effect.

The actions in alternative B would not affect known ethnographic uses of national memorial resources. New developments would be minor, and any effect they would have on ethnographic resources would be partially or fully mitigated by sensitive siting and design of facilities. Managing most of the national memorial lands in the conservation (75%) or education (15%) prescriptions would protect and preserve ethnographic resources. Therefore, the long-term beneficial effects of alternative B on ethnographic resources would be moderate to major.

Cumulative Effects. Until recently, Coronado National Memorial has made no attempt to identify ethnographic resources; however, it is now in the process of identifying and protecting those resources. Cochise County plans for increased growth in the southern San Pedro Valley, but with guidelines on the scale, density, location, and type of development. However, growth might affect ethnographic resources. The county has identified scenic corridors and conservation easement areas, and this could protect ethnographic resources. These actions, added to the national memorial's efforts to preserve ethnographic resources, could result in long-term moderate to major beneficial effects on the understanding and appreciation of ethnographic resources.

Conclusion. No action or development in alternative B would affect known ethnographic resources. The various programs and partnerships that the national memorial would develop to emphasize the area's multicultural heritage would result in long-term moderate to major beneficial effects on ethnographic resources.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of ethnographic resources would result from implementing alternative B.

Cultural Landscapes

Analysis. Removing the Montezuma Ranch structures and restoring and revegetating the area would enhance the views from Montezuma Pass, making them more representative of the time of the Coronado Expedition. Revegetating abandoned roads and powerline areas would improve cultural landscapes. The visitor center annex would be designed not to affect cultural landscapes, and a cultural landscape report would be undertaken before the building was designed so that areas of the national memorial containing cultural landscapes could be determined and treatment procedures recommended. This report also would guide the location and design of employee housing so as to minimize the effects on cultural landscapes.

None of the proposed development would affect NPS structures and features already identified on the national memorial's list of classified structures as meriting preservation. Managing most of the national memorial lands in the conservation (75%) or education (15%) prescriptions would protect and preserve potential cultural landscapes. The long-term beneficial effects on cultural landscapes from alternative B would be minor to moderate.

Cumulative Effects. Coronado National Memorial has recognized the importance of the CCC roadwork from the past and is now treating the Montezuma Pass road as a significant cultural landscape. Coronado National Forest plans to maintain and enhance the integrity of visual resources. Cochise County plans for increased growth in the southern San Pedro Valley, but with guidelines on the scale, density, location, and type of the development to reduce visual impacts, and the county has identified scenic corridors and conservation easement areas. The Bureau of Land Management plans to protect and conserve cultural resources in the San Pedro Riparian National Conservation Area. Less development would reduce but not eliminate impacts on cultural landscapes. These actions, added to the national memorial's efforts to preserve and enhance cultural landscapes, could result in long-term minor beneficial effects on the area's cultural landscapes.

Conclusion. The developments of alternative B would be minimal, and the impacts on cultural landscapes would be partially or fully mitigated by sensitive siting and design, augmented by other protective measures such as vegetative screening. This alternative would result in long-term minor to moderate beneficial effects on cultural landscapes.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of cultural landscapes would result from implementing alternative B.

Section 106 Summary. Under the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5) addressing the criteria of effect and adverse effect, the National Park Service finds that the actions of alternative B would not adversely affect cultural landscapes.

ALTERNATIVE C

Archeological Resources

Analysis. Limiting ground-disturbing activities to previously disturbed areas and keeping 90% of the national memorial in the conservation prescription would make it possible to preserve resources for future scientific study. This would be a long-term minor to moderate beneficial effect.

Eliminating grazing from the memorial would relieve archeological resources in both allotments (1,811 acres) from disturbance by cattle, a long-term minor to moderate beneficial effect.

Cumulative Effects. Cattle grazing would continue to disturb surface archeological resources outside the memorial. Coronado National Forest plans to continue inventories and use the information to preserve and interpret cultural resources. Cochise County plans for increased growth in the southern San Pedro Valley, with some restriction on the scale and density of the development. The Bureau of Land Management plans to protect and conserve cultural resources in the San Pedro Riparian National Conservation Area. These actions, along with the national

memorial's limited development, could result in long-term negligible to minor beneficial effects on the area's archeological resources.

Conclusion. Archeological resources probably would not be affected under alternative C, with development in the national memorial limited and most of it taking place in previously disturbed areas. Therefore, alternative C would result in long-term negligible to minor beneficial effects on archeological resources.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of archeological resources would result from implementing alternative C.

Section 106 Summary. Under the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5) addressing the criteria of effect and adverse effect, the National Park Service finds that the actions of alternative C would not adversely affect archeological resources. All national memorial resources that have been determined eligible for nomination to the National Register of Historic Places (International Boundary Monuments 100, 101, and 102 and the Montezuma Pass road) would not be adversely affected by the actions of this alternative.

Historic Structures

Analysis. A formal determination of eligibility for listing on the National Register of Historic Places has not been completed for the various Montezuma Ranch structures. The staff of the national memorial is consulting with the Arizona state historic preservation office about evaluating the structures for their eligibility. The staff is gathering documentation to submit to the Arizona state historic preservation office so that a formal determination of eligibility can be completed. Any structures found ineligible for listing would be torn down; this would result in no effect. The structures determined to be eligible, if any, would be stabilized and preserved, resulting in a long-term minor beneficial effect on this historic resource.

The memorial's visitor center has not been formally evaluated for its eligibility for listing on the national register, but its status as a "Mission 66" structure makes it potentially eligible. A determination of its eligibility would be completed to guide the rehabilitation work on the building's interior. If it was found not to be eligible, there would be no effect. If it was found eligible, the rehabilitation proposed in this alternative would result in a long-term moderate beneficial effect.

Cumulative Effects. Before the Historic Preservation Act was passed in 1966, various mining and ranch structures on lands now in the national memorial were removed or neglected, but since the act was passed, the memorial has identified historic structures and now works toward their preservation. Coronado National Forest plans to continue developing inventories to use in preserving and interpreting cultural resources. The Bureau of Land Management plans to protect and conserve cultural resources in the San Pedro Riparian National Conservation Area. These actions, added to the limited scope of Coronado National Memorial's preservation efforts, could result in long-term negligible beneficial effects on the area's historic structures.

Conclusion. Before taking any action regarding the visitor center or the Montezuma Ranch structures, the national memorial staff would pursue a formal determination of the

structures' eligibility for the National Register of Historic Places. Research and resource documentation are improving the national memorial's ability to make informed management decisions. The ongoing efforts to identify and preserve historic structures would benefit these resources. The overall result would be a long-term negligible beneficial effect on the national memorial's historic structures.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of resources or values related to historic structures would result from implementing alternative C.

Section 106 Summary. Under the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5) addressing the criteria of effect and adverse effect, the National Park Service finds that the survey work and continuing preservation work of the national memorial under alternative C would have an effect that would not be adverse.

Ethnographic Resources

Analysis. None of the actions of alternative C, which would involve little development, would interfere with the primary ethnographic use of the national memorial by American Indians. Restoring natural contours and vegetation could make more areas suitable for ethnographic use. Therefore, alternative C would result in long-term negligible to minor beneficial effects on ethnographic resources.

Cumulative Effects. Until recently, Coronado National Memorial has made no attempt to identify ethnographic resources; however, it is now in the process of identifying and protecting those resources. Cochise County plans for increased growth in the southern San Pedro Valley, but with guidelines on the scale, density, location, and type of the development. However, such growth might adversely affect ethnographic resources. The county has identified scenic corridors and conservation easement areas, which could protect ethnographic resources. The Bureau of Land Management plans to protect and conserve cultural resources in the San Pedro Riparian National Conservation Area. These actions, along with the national memorial's preservation efforts and minimal development under alternative C (which would avert the disturbance of ethnographic resources) could result in long-term negligible to minor beneficial effects on the area's ethnographic resources.

Conclusion. The lack of development in the form of trail, roads, and buildings in alternative C would protect the national memorial's ethnographic resources from disturbance. Restoring and revegetating areas of powerlines, roads, and nonhistoric structures would make more areas suitable for ethnographic use. All these actions combined would result in long-term negligible to minor beneficial effects on ethnographic resources.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of ethnographic resources would result from implementing alternative C.

Cultural Landscapes

Analysis. Having more than 90% of the national memorial in the conservation management prescription under alternative C would mean that areas would be managed to preserve resources for future scientific study. This alternative would restore cultural landscapes to their condition at the time of the Coronado Expedition, a long-term negligible to minor beneficial effect.

Cumulative Effects. Coronado National Memorial has recognized the importance of the CCC roadwork from the past and is now treating the Montezuma Pass road as a significant cultural landscape. Coronado National Forest plans to maintain and enhance visual resource integrity. Cochise County plans for increased growth in the southern San Pedro Valley, but with guidelines on the scale, density, location, and type of the development to reduce visual impacts, and the county has identified scenic corridors and conservation easement areas. The Bureau of Land Management plans to protect and conserve cultural resources in the San Pedro Riparian National Conservation Area. These actions, added to the national memorial's efforts to preserve and enhance cultural landscapes, could result in long-term minor beneficial effects on the region's cultural landscapes.

Conclusion. The limited development proposed in alternative C would result in the restoration of landscapes to be representative of the time of the Coronado Expedition; therefore, this alternative would result in long-term negligible to minor beneficial effects on cultural landscapes.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of cultural landscapes would result from implementing alternative C.

Section 106 Summary. Under the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5) addressing the criteria of effect and adverse effect, the National Park Service finds that the actions of alternative C would not have an adverse effect on cultural landscapes.

ALTERNATIVE D

Archeological Resources

Analysis. Surveys at the national memorial have not found any archeological sites that could not be avoided by careful planning for the following ground-disturbing actions of alternative D:

- removing the Montezuma Ranch structures and building an educational center or adaptively using the structures
- adding a paved parking area and road to the ranch site
- rebuilding and paving East Forest Lane
- building a paved parking area and a commemorative feature at the end of East Forest Lane
- expanding the visitor center and adding more parking
- upgrading the road to the picnic area and adding picnic sites
- developing four new trails

About 70% of these actions would take place in previously disturbed areas and the rest in undisturbed areas. There could be unknown archeological resources in the areas that would be disturbed, and if any were found, actions would be taken for their protection. (see "Mitigating Measures," p. 65). None of

the above actions would be expected to affect known archeological resources.

The increased accessibility by trail and paved road in the grasslands could result in vandalism to archeological resources in those areas. Further evaluation would be necessary when design planning for the developments was begun, with archeological surveys undertaken in the areas selected for development. The designs of developments would be based on the surveys to minimize the impacts on resources. The continuing identification and location of archeological resources would result in their being preserved in place, a negligible long-term beneficial effect.

Continuing grazing in the Joe's Spring allotment (1,143 acres) would make it possible that archeological resources, mainly lithic scatters, could be disturbed by cattle, but eliminating grazing from the Montezuma allotment would remove the possibility of grazing disturbance on 668 acres. Ground disturbance would be limited by the management prescriptions of this alternative, with more than 80% of the national memorial in the conservation prescription and 10 % in the education prescription. The actions of alternative D would result in a negligible to minor long-term adverse impact on archeological resources.

Cumulative Effects. Cattle grazing would continue to disturb surface archeological resources outside the memorial. Coronado National Forest plans to continue inventorying, preserving, and interpreting cultural resources. Cochise County plans for increased growth in the southern San Pedro Valley, with some restriction on the scale and density of the development. The Bureau of Land Management plans to protect and conserve cultural resources in the San Pedro Riparian National Conservation Area. These actions, added to increased development in the national memorial, could result in long-term minor adverse impacts on the area's archeological resources.

Conclusion. Much of the new development in Coronado National Memorial under alternative D would be limited to previously disturbed areas. The large number of ground-disturbing actions in this alternative would increase the possibility of affecting archeological resources. Overall, the actions of this alternative would result in a long-term negligible adverse impact on archeological resources.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of archeological resources would result from implementing alternative D.

Section 106 Summary. Under the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5) addressing the criteria of effect and adverse effect, the National Park Service finds that the actions of alternative D would not have an adverse effect on archeological resources. All national memorial resources that have been determined eligible for nomination to the National Register of Historic Places (International Boundary Monuments 100, 101, and 102 and the Montezuma Pass road) would not be adversely affected by the actions of alternative D.

Historic Structures

Analysis. A formal determination of eligibility for listing on the National Register of Historic Places has not been completed for the various Montezuma Ranch structures. The staff of the national memorial is consulting with the Arizona state historic preservation office

about evaluating the structures for their eligibility. The staff is gathering documentation to submit to the Arizona state historic preservation office so that a formal determination of eligibility can be completed. Any structures found ineligible for listing would be torn down; this would result in no effect. The structures determined to be eligible, if any, would be stabilized and preserved, resulting in a long-term minor beneficial effect on this resource.

The memorial's visitor center has not been formally evaluated for its eligibility for listing on the national register, but its status as a "Mission 66" structure makes it potentially eligible. A determination of its eligibility would be completed to guide the rehabilitation work on the building's interior. If it was found not to be eligible, there would be no effect. If it was found eligible, the rehabilitation proposed in this alternative would result in a long-term moderate beneficial effect.

Cumulative Effects. Before the Historic Preservation Act was passed in 1966, various mining and ranch structures on lands now in the national memorial were removed or neglected, but since the act was passed, the memorial has identified historic structures and now works toward their preservation. Coronado National Forest plans to continue developing inventories to use in preserving and interpreting cultural resources. The Bureau of Land Management plans to protect and conserve cultural resources in the San Pedro Riparian National Conservation Area. These actions, added to Coronado National Memorial's limited preservation efforts, could result in long-term negligible beneficial effects on the area's historic structures.

Conclusion. Before taking any action regarding the visitor center or the Montezuma Ranch structures, the national memorial staff would pursue a formal determination of the structures' eligibility for the National Register of Historic Places. Research and resource documentation are improving the national memorial's ability to make informed management decisions. The ongoing efforts to identify and preserve historic structures would benefit these resources. The overall result would be a long-term negligible beneficial effect on the national memorial's historic structures.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of resources or values related to historic structures would result from implementing alternative D.

Section 106 Summary. Under the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5) addressing the criteria of effect and adverse effect, the National Park Service finds that the survey work and continuing preservation work of the national memorial under alternative D would have an effect that would not be adverse.

Ethnographic Resources

Analysis. New and upgraded trails and roads under alternative D would improve access to and within the national memorial, bringing visitors to previously little visited areas. Restoring natural contours and revegetating the areas of powerlines and abandoned roads would not interfere with the ethnographic use of the national memorial by American Indians. The long-term effects of alternative D on ethnographic resources would be negligible and beneficial.

Cumulative Effects. Until recently, Coronado National Memorial has made no

attempt to identify ethnographic resources; however, it is now in the process of identifying and protecting those resources. Coronado National Forest plans to protect ethnographic resources. Cochise County plans for increased growth in the southern San Pedro Valley, but with guidelines on the scale, density, location, and type of the development; however, such growth might adversely affect ethnographic resources. The county has identified scenic corridors and conservation easement areas that could protect ethnographic resources. The Bureau of Land Management plans to protect and conserve cultural resources in the San Pedro Riparian National Conservation Area. These actions, added to the actions of Coronado National Memorial under alternative D, would result in long-term negligible beneficial effects on the area's ethnographic resources.

Conclusion. The possibility of affecting ethnographic resources would be greater in alternative D than in some of the other alternatives because there would be greater access to areas of the national memorial. The actions in this alternative could result in a long-term negligible beneficial effect on ethnographic resources.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of ethnographic resources would result from implementing alternative D.

Cultural Landscapes

Analysis. Reestablishing natural contours and revegetating the areas of abandoned powerlines and roads could affect cultural landscapes, as could road and trail building and removing nonhistoric structures. None of the roads, trails, or structures has been identified as being part of cultural landscapes; therefore, these actions would not cause effects on cultural landscapes.

With more than 80% of the national memorial in the conservation prescription and 10 % in the education prescription, the views that represent the way the country looked to the Coronado Expedition would be perpetuated. Even though the siting, design, and vegetative screening of the new facilities and roads would be done with care, vehicles on the roads and in the parking lots still could be visually intrusive from Montezuma Pass. Cultural landscapes would be protected during the expansion and rehabilitation of the visitor center and the construction of employee housing. The actions of alternative D would result in a negligible long-term adverse effect on cultural landscapes.

Cumulative Effects. Coronado National Memorial has recognized the importance of the CCC roadwork from the past and is now treating the Montezuma Pass road as a significant cultural landscape. Coronado National Forest plans to maintain and enhance the integrity of its visual resources. Cochise County plans for increased growth in the southern San Pedro River Valley, but with guidelines on the scale, density, location, and type of the development to reduce visual impacts. In addition, the county has identified scenic corridors and conservation easement areas. The Bureau of Land Management plans to protect and conserve cultural resources in the San Pedro Riparian National Conservation Area. These actions, added to the national memorial's actions under alternative D that might adversely affect cultural landscapes, could result in long-term negligible adverse impacts on the area's cultural landscapes.

Conclusion. The possibility of adversely affecting cultural landscapes would be greater in this alternative than in some of the other

action alternatives because of the variety of actions (constructing roads, facilities, and trails) that would take place. The actions of alternative D would result in a long-term negligible adverse impact on cultural landscapes.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of cultural landscapes would result from implementing alternative D.

Section 106 Summary. Under the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5) addressing the criteria of effect and adverse effect, the National Park Service finds that the actions of alternative D would not adversely affect cultural landscapes.

ALTERNATIVE E

Archeological Resources

Analysis. Surveys at the national memorial have not found any archeological sites that could not be avoided by careful planning for the ground-disturbing actions of alternative E — building a new visitor/educational center about 0.7 mile north of the Montezuma Canyon Road, adding a paved parking area and road to the site, removing the Montezuma Ranch structures, and developing four new trails. There could be unknown archeological resources in the areas that would be disturbed, and if any were found, actions would be taken for their protection. (see "Mitigating Measures," p. 65). The continuing identification and location of archeological resources would result in their being preserved in place, a negligible long-term beneficial effect.

With about 85% of the national memorial in the conservation prescription under this alternative, and with the other 15% in the education prescription, the ground disturbance would be limited. Most of the ground disturbance would take place in grasslands north of the main road, about 10% of it in previously disturbed areas; the other 90% in previously undisturbed areas. Because the area that would be developed in this alternative contains relatively undisturbed areas, there would be a greater likelihood of finding previously unknown resources than in the other alternatives.

The increased accessibility by trail and paved road in the grasslands could result in vandalism to archeological resources in those areas. Further evaluation would be necessary when design planning for the developments was begun, with archeological surveys undertaken in the areas to be developed. Designs of developments would be based on the surveys to minimize the impacts on resources.

Continuing grazing in the Montezuma allotment (668 acres) would make it possible that archeological resources, mainly lithic scatters, could be disturbed by cattle, but eliminating grazing from the Joe's Spring allotment would remove the possibility of grazing disturbances on 1,143 acres. The continued disturbance of archeological sites by cattle would result in a long-term minor to moderate adverse impact on archeological resources.

Cumulative Effects. Cattle grazing would continue to disturb surface archeological resources outside the memorial. Coronado National Forest plans to continue inventorying resources and using the inventories to preserve and interpret cultural resources. Cochise County plans for increased growth in the southern San Pedro Valley, with some restriction on the scale and density of the

development. The Bureau of Land Management plans to protect and conserve cultural resources in the San Pedro Riparian National Conservation Area. These actions, added to increased development in Coronado National Memorial under alternative E, could result in long-term minor adverse impacts on the area's archeological resources.

Conclusion. Much of the new development in Coronado National Memorial under alternative E would take place in previously undisturbed areas. The variety of ground-disturbing actions in this alternative would increase the possibility of affecting archeological resources. Overall, the actions of this alternative would result in a long-term negligible to minor adverse impact on archeological resources.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of archeological resources would result from implementing alternative E.

Section 106 Summary. Under the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5) addressing the criteria of effect and adverse effect, the National Park Service finds that the national memorial's actions under alternative E would not have an adverse effect on archeological resources. All national memorial resources that have been determined eligible for nomination to the National Register of Historic Places (International Boundary Monuments 100, 101, and 102 and the Montezuma Pass road) would not be adversely affected by the actions of this alternative.

Historic Structures

Analysis. A formal determination of eligibility for listing on the National Register of Historic Places has not been completed for the various Montezuma Ranch structures. The staff of the national memorial is consulting with the Arizona state historic preservation office about evaluating the structures for their eligibility. The staff is gathering documentation to submit to the Arizona historic preservation office so that a formal determination of eligibility can be completed. Any structures found ineligible for listing would be torn down; this would result in no effect. The structures determined to be eligible, if any, would be stabilized and preserved, resulting in a long-term minor beneficial effect on this archeological resource.

The memorial's visitor center has not been formally evaluated for its eligibility for listing on the national register, but its status as a "Mission 66" structure makes it potentially eligible. A determination of its eligibility would be completed to guide the rehabilitation work on the building's interior. If it was found not to be eligible, there would be no effect. If it was found eligible, the rehabilitation proposed in this alternative would result in a long-term moderate beneficial effect.

Cumulative Effects. Before the Historic Preservation Act was passed in 1966, various mining and ranch structures on lands now in the national memorial were removed or neglected, but since the act was passed the memorial has identified historic structures and now works toward their preservation. Coronado National Forest plans to continue developing inventories to use in preserving and interpreting cultural resources. The Bureau of Land Management plans to protect and conserve cultural resources in the San Pedro Riparian National Conservation Area. These actions, added to Coronado National Memorial's limited preservation efforts, could result in long-term negligible beneficial effects on the area's historic structures.

Conclusion. Research and resource documentation are improving the national memorial's ability to make informed management decisions. The ongoing efforts to identify and preserve historic structures would benefit these resources. The overall result would be a long-term negligible beneficial effect on the historic structures of the national memorial.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of resources or values related to historic structures would result from implementing alternative E.

Section 106 Summary. Under the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5) addressing the criteria of effect and adverse effect, the National Park Service finds that the survey work and continuing preservation work of the national memorial under alternative E would have an effect that would not be adverse.

Ethnographic Resources

Analysis. New and upgraded trails and roads under alternative E would improve access to and within the national memorial, bringing visitors to previously little visited areas. Restoring natural contours and revegetating areas of powerlines and abandoned roads would not interfere with the ethnographic use of the memorial by American Indians. The long-term beneficial effects of alternative E on ethnographic resources would be negligible.

Cumulative Effects. Until recently, Coronado National Memorial has made no attempt to identify ethnographic resources; however, it is now in the process of identifying and protecting those resources. Coronado National Forest plans to protect ethnographic resources. Cochise County plans for increased growth in the southern San Pedro Valley, but with guidelines on the scale, density, location, and type of the development; however, such growth might adversely affect ethnographic resources. The county has identified scenic corridors and conservation easement areas that could protect ethnographic resources. The Bureau of Land Management plans to protect and conserve cultural resources in the San Pedro Riparian National Conservation Area. These actions, added to the actions of Coronado National Memorial under alternative E, would result in long-term negligible adverse effects on the area's ethnographic resources.

Conclusion. The possibility of adversely affecting ethnographic resources would be greater in alternative E than in some of the other alternatives because visitors would have more access to the grasslands in the national memorial. The actions of this alternative could have a long-term negligible adverse impact on ethnographic resources.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of ethnographic resources would result from implementing alternative E.

Cultural Landscapes

Analysis. Reestablishing natural contours and revegetating the areas of abandoned powerlines and roads could affect cultural landscapes, as could road and trail building and removing nonhistoric structures. However, because none of the roads, trails, or structures have been identified as being part of cultural landscapes, no effects on cultural landscapes would result from these actions.

With about 85% of the national memorial in the conservation prescription and 15 % in the education prescription, the views that represent the way the country looked to the Coronado Expedition would be perpetuated under alternative E. Even though the siting, design, and vegetative screening of the new facilities and roads would be done with care, vehicles on the roads and in the parking lots still could be visually intrusive from Montezuma Pass. The actions of alternative E would result in a negligible long-term adverse effect on cultural landscapes.

Cumulative Effects. Coronado National Memorial has recognized the importance of the CCC roadwork from the past and is now treating the Montezuma Pass road as a significant cultural landscape. Coronado National Forest plans to maintain and enhance visual resource integrity. Cochise County plans for increased growth in the southern San Pedro Valley, but with guidelines on the scale, density, location, and type of development to reduce visual impacts. In addition, the county has identified scenic corridors and conservation easement areas. The Bureau of Land Management plans to protect and conserve cultural resources in the San Pedro Riparian National Conservation Area. These actions, along with NPS actions under alternative E (which could possibly have a beneficial effect on cultural landscapes) could result in long-term negligible beneficial effects on the area's cultural landscapes.

Conclusion. The possibility of adversely affecting cultural landscapes would be greater in this alternative than in some of the other action alternatives because of the variety of actions (constructing roads, facilities, and trails) that would take place. The actions of alternative E would result in a long-term negligible adverse impact on cultural landscapes.

Impairment. The resources and values of Coronado National Memorial would not be impaired because there would be no major adverse effects on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the national memorial, (2) key to the natural or cultural integrity of the memorial or to opportunities for visitor enjoyment, or (3) identified as a goal in this *General Management Plan* or other relevant NPS planning documents. Consequently, no impairment of cultural landscapes would result from implementing alternative E.

Section 106 Summary. Under the regulations of the Advisory Council on Historic Preservation (36 CFR 800.5) addressing the criteria of effect and adverse effect, the National Park Service finds that the actions of alternative E would not adversely affect cultural landscapes.

UNAVOIDABLE ADVERSE IMPACTS

The long-term adverse impacts on cultural resources that would result from accommodating visitors and their vehicles would be negligible.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The construction of facilities and other ground-disturbing activities could result in the loss of some archeological values through surface disturbance, inadvertent damage, or possible vandalism. This would vary slightly by site and by alternative.

RELATIONSHIPS OF SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

Constructing trails, roads, and facilities for visitors and operations could result in slight short-term adverse effects on archeological or ethnographic resources or cultural landscapes, as could demolishing structures or revegetating areas. This would occur before and during construction or revegetation, when the site would be vulnerable to vandalism or other destructive activities. However, in the long term, completing these actions would save resources and enhance the preservation of the memorial's cultural resources. These long-term beneficial effects would occur in all the action alternatives, with the greatest effects in alternative B.

The various partnerships that would help to foster public appreciation and preservation of cultural resources, resulting in long-term minor to moderate beneficial effects. These beneficial effects would be greatest under alternatives B and D.

ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

Energy requirements would increase with the construction of new structures. This would be mitigated by designing all structures to be energy-efficient. Alternatives D and E would require the most energy of all the alternatives because of the number of structures that would be maintained and used.

EFFECTS ON VISITOR UNDERSTANDING AND RECREATIONAL RESOURCES

EFFECTS COMMON TO ALL ACTION ALTERNATIVES

Visitation to Coronado Cave nearly doubled between 1990 and 2000. Nearly 6 % of the people who visit Coronado National Memorial include exploring Coronado Cave in their visit. To protect cave resources, in all the action alternatives the national memorial would determine the cave's carrying capacity and restrict visitation when the limit was exceeded. Overall, setting limits on cave visitation would result in a negligible adverse impact on visitor understanding because only a small percentage of memorial visitors go to the cave. However, for people whose primary interest in the memorial is to visit the cave, setting a carrying capacity (with the potential that some visitors would not be allowed to use the cave when that capacity was reached) would result in a long-term moderate adverse effect.

Offering more intensive interpretation in the Montezuma Pass area would enhance visitor understanding and the visitor experience by offering opportunities to understand and appreciate the memorial's significant natural and cultural resources. Because visitors' use of the memorial's trails is minimal, this beneficial effect on visitor experience would be negligible to minor.

Developing interpretive media to support the national memorial's interpretive themes and focus on the memorial's mission, purpose, and significance would help to foster in visitors a greater appreciation of the memorial's resources. This would result in a minor to moderate beneficial effect on the visitor experience.

ALTERNATIVE A

Analysis

Access to Resources. The opportunity for visitors to experience the memorial's resources would be unchanged under alternative A, with most visitors spending one to two hours at the visitor center collections, the interpretive trail, the picnic area, and the Montezuma Pass overlook. Access for visitors with disabilities would be unchanged. Thus, visitors' ability to experience valuable resources would be limited, resulting in a negligible to minor adverse effect on the visitor experience.

Interpretation and Orientation. Continuing the existing displays of artifacts and paintings at the visitor center, wayside exhibits, and sales publications, as well as interpretive services such as self-guiding trails, volunteer interpretive programs, and occasional cultural demonstrations would be moderately important in conveying information to visitors and decreasing physical impacts on natural and cultural resources. Crowding at the visitor center would continue, adversely affecting the quality of the visitor experience. The long-term adverse effects on the visitor experience would be moderate.

Visitor Numbers and Recreation. If the overall use of the national memorial continued to increase, and if the proportion of visitors from outside the local area kept increasing, the visitor experience might eventually be affected unless there was a corresponding improvement in visitor services. Recreational use in the memorial would be adversely affected by the deterioration of the memorial's facilities and attractions from overuse, by the deferment of maintenance to divert funds to recreation-serving priorities, and by a possible decrease in long-term

visitation owing to the memorial's becoming less attractive as a recreation site.

Removing the Montezuma Ranch structures would make it possible to offer visitors an uninterrupted view of the San Pedro Valley from the Montezuma Peak scenic lookout. This would improve scenic values and result in a long-term minor to moderate beneficial effect on visitor understanding and the visitor experience.

Increasing visitor interest in exploring more of the memorial and complaints about the livestock in the grazing allotments indicate that reduced aesthetics and disturbed habitats degrade the visitor experience. With the local population growing and the demands for recreation and opportunities to observe wildlife and vegetation, increasing, continuing grazing would be likely to meet with more objections. Objections to continued grazing in this relatively small unit of the national park system also could come from people interested in having the memorial managed as a preserve for native plant and animal life in a region heavily used by the livestock industry. Therefore, continuing grazing would result in a long-term minor to moderate adverse impact on the visitor experience for those who would like to experience natural resources.

Cumulative Effects

Developments of various kinds outside the memorial boundaries in the United States and Mexico threaten to degrade the views from Montezuma Pass. Cochise County plans for increased growth in the southern San Pedro Valley, but with guidelines on the scale, density, location and type of development to reduce visual impacts. In addition, the county has identified scenic corridors and conservation easements. Coronado National Forest plans to maintain and enhance visual resource integrity. Continued protection of the viewshed in the national memorial, combined with these activities, would result in beneficial effects on regional visitors.

Accessible campsites and interpretive facilities in Coronado National Forest offer recreational opportunities for mobility-impaired visitors. These facilities, along with other recreational opportunities in adjacent areas like state parks and the national conservation area, make it possible for visitors to experience the region's natural and cultural resources. These entities also offer orientation, visitor information, and other services to help acquaint the visitors with the area. Local chambers of commerce, private museums, and attractions also offer interpretation. These available regional recreational and interpretive resources would result in a moderate beneficial effect on visitor understanding in the region, and regional opportunities would help to offset the minor to moderate adverse impacts on the visitor experience that would result from alternative A.

Actions of the U.S. Immigration and Naturalization Service and the U.S. Border Patrol, along with Cochise County, to reduce illegal immigration and drug traffic along the smuggling route in the national memorial (such as fences along the international border) might reduce the potential for national memorial visitors to encounter smugglers, thereby enhancing visitor safety and the visitor experience.

Conclusion

Continuing the limitations on access to natural resources and cultural exhibits for mobility-impaired visitors along the memorial's trails would result in long-term negligible adverse impacts. If the demand for recreational resources continued to increase and no improvements were made, there would be local minor to moderate long-term adverse impacts on the visitor experience. Removing the Montezuma Ranch structures and restoring and revegetating the area would improve scenic values and the visitor experience from Montezuma Pass, resulting in a long-term minor beneficial effect on the visitor experience. Continued grazing in the

memorial would have a long-term negligible to minor adverse impact on visitors wanting to hike in the allotments.

ALTERNATIVE B

Analysis

Access to Resources. Developing four new trails and making two of them accessible for mobility-impaired visitors under alternative B would give visitors better access to natural resources and cultural exhibits. Ending grazing in the memorial would enable visitors to reach previously undervisited grassland habitats more easily, so that these areas would be more available for hiking and birding. The long-term benefits to visitor access would be negligible to minor because only a small percentage of the people who visit the memorial hike the trails.

Adding more parking spaces at the visitor center and parking spaces for buses and recreational vehicles would reduce congestion, as would adding more pullouts. The new pullouts also would afford easier and safer access to views of the national memorial resources. These actions would result in long-term minor to moderate beneficial effects on visitor understanding and the visitor experience, which would vary depending on the level of visitation.

Interpretation and Orientation. Expanding the visitor center and updating interpretive materials would reduce congestion and improve the memorial's ability to convey the story of Coronado National Memorial's natural and cultural resources, improving visitor understanding and the visitor experience. Offering more in-depth interpretation at the rehabilitated visitor center and at Montezuma Pass and adding interpretive media in other locations, along with events sponsored by the national memorial, would give more visitors an opportunity to appreciate and understand the story of the memorial. Working with other groups on interpretive programs and activities to support appreciation of the memorial's natural and cultural resources and improving interpretive materials would enhance the visitor experience. These actions would encourage increased participation in interpretation and educational programs, which would result in a moderate beneficial effect on the visitor experience.

Visitor Numbers and Recreation. As the actions in this alternative are implemented, visitation numbers could gradually increase to nearly 40,000 visitors per year. Developing a group picnic area would reduce congestion in the current picnic area, especially during high visitation times. There would be minor short-term adverse effects on recreation from construction activities (noise, area closures), but the enlarged facilities would accommodate larger numbers of visitors, helping to disperse them and reducing crowding, which would result in long-term minor to moderate beneficial effects on the visitor experience.

Removing the Montezuma Ranch structures and restoring and revegetating that area and East Forest Lane would enable visitors to enjoy an uninterrupted view of the San Pedro Valley from the Montezuma Peak scenic lookout, improving scenic values, a long-term minor to moderate beneficial effect.

Cumulative Effects

Various kinds of development in Mexico and the United States (outside the memorial boundaries) threaten to degrade the views from Montezuma Pass. Cochise County plans for increased growth in the southern San Pedro Valley, but with guidelines on the scale, density, location and type of development to reduce visual impacts. In addition, the county has identified scenic corridors and conservation easements. Coronado National Forest plans to maintain and enhance visual resource integrity. Continued protection of the viewshed in the memorial, combined with

these activities, would result in beneficial cumulative effects for visitors to the region.

Accessible campsites and interpretive facilities in Coronado National Forest offer recreational opportunities for mobility-impaired visitors. These facilities, along with other recreational opportunities in adjacent areas like state parks and the national conservation area, make it possible for visitors to experience the region's natural and cultural resources. These entities also offer orientation, visitor information, and other services to help acquaint the visitors with the area. Local chambers of commerce, private museums, and attractions also offer interpretation. These available regional recreational and interpretive resources would combine with increased recreational opportunities in the memorial under alternative B to result in cumulative beneficial effects on the visitor experience.

The potential for national memorial visitors to encounter smugglers might be reduced by actions taken by the U.S. Immigration and Naturalization Service, the U.S. Border Patrol, and Cochise County to reduce illegal immigration and drug traffic along the smuggling route (such as fences along the international border). This would enhance visitor safety and the visitor experience.

Conclusion

Improving recreational services and facilities in Coronado National Memorial would result in negligible to minor short-term and long-term beneficial effects on the visitor experience. The visitor experience also would be enhanced by resource conservation. Improving interpretive materials and expanding outreach programs that emphasize the memorial's mission, purpose, and significance would enhance the opportunities for visitors to learn about and understand the memorial's resources, a moderate long-term beneficial effect on the visitor experience.

Eliminating grazing would enable visitors to experience the natural resources of the grasslands, a negligible to minor beneficial effect on the visitor experience.

ALTERNATIVE C

Analysis

Access to Resources. Upgrading the trail at the visitor center and making it accessible to mobility-impaired visitors would enhance visitor access to natural exhibits. Ending grazing in the memorial might result in increased use of the allotment areas by visitors, but not developing new trails might restrict recreational activity compared to alternative B. These actions would result in negligible beneficial effects on the visitor experience. The beneficial effects from improving the visitor center trail would be negligible because the trail is small.

Developing more parking at the visitor center and adding parking for buses and recreational vehicles would reduce congestion. The beneficial effects of these actions on visitor understanding and the visitor experience would vary, depending on the level of visitation; they would be negligible to minor because the size of these developments in alternative C would be smaller than the changes in alternative B.

Interpretation and Orientation. Emphasizing work with other groups to tell the memorial's story and reach beyond the boundary would result in effects similar to those described for alternative B; however, because interpretation in the memorial would not be enhanced in alternative C, the benefits would be fewer. Only a minor beneficial effect on visitor understanding and the visitor experience would result from using outreach programs alone.

Visitor Numbers and Recreation. As the actions in this alternative are implemented, visitation numbers could gradually increase to nearly 40,000 visitors per year. The

recreational opportunities available under alternative C would be similar to those described for alternative A. Upgrading the interpretive trail at the visitor center would broaden opportunities, mainly for mobility-impaired visitors. Removing the Montezuma Ranch structures and restoring and revegetating the area would enable visitors to enjoy an uninterrupted view of the San Pedro Valley from the Montezuma Peak scenic lookout, improving scenic values, a long-term minor to moderate beneficial effect.

Cumulative Effects

The cumulative effects of alternative C on the visitor experience would be similar to those described for alternative A.

Conclusion

Under alternative C, access via memorial trails to natural resources and cultural exhibits for visitors with disabilities would continue to be limited, a negligible to minor adverse impact. Ending grazing in the memorial would enable some visitors to use grassland areas that have been little used for recreation; however, with no trails being developed in the allotment areas, the use would remain limited. Expanding the NPS facilities would result in short-term minor to moderate adverse impacts on the visitor experience, but in the long term there would be minor to moderate beneficial effects resulting from decreased congestion and improved views. Using outreach programs alone to emphasize the memorial's interpretive themes would result in only a minor beneficial effect on visitor understanding and the visitor experience.

ALTERNATIVE D

Analysis

Access to Resources. Eliminating grazing from the Montezuma allotment would enable people to visit grassland habitats that previously were little used by visitors. The beneficial effect on the visitor experience would be negligible to minor because only a small percentage of the people who visit the memorial hike the trails. Upgrading some trails for accessibility would result in negligible to minor beneficial effects for visitors with disabilities by improving their access to the memorial's natural and cultural resources.

Establishing a commemorative feature at the end of East Forest Lane would result in a major attraction, offering visitors an opportunity to understand and appreciate the Coronado Expedition and fostering international amity. Paving East Forest Lane for vehicle access to the new feature in an area previously restricted to vehicles would enable visitors to experience the natural resources of the grasslands. This development would result in a long-term moderate to major beneficial effect on the visitor experience.

Adding parking spaces at the visitor center and the picnic area and developing more pullouts and picnic sites would reduce congestion in these high use areas, and the new pullouts would make it easier and safer to reach areas where views can be seen. These developments would result in long-term minor to moderate beneficial effects on the visitor experience, which would vary depending on the level of visitation.

Interpretation and Orientation. Interpretive emphasis on the memorial's international themes at the visitor center, the educational center, and the border commemorative feature would result in moderate beneficial effects on visitor understanding and the visitor experience. Moderate beneficial effects also would result from NPS sponsorship of events at universities and in the memorial and from offering exhibits and interpretive programs at the visitor and educational center. NPS participation in increasing outreach educational programs also would result in moderate beneficial effects on visitor understanding and the visitor experience.

Visitor Numbers and Recreation. As the actions in this alternative are implemented, visitation numbers could gradually increase to nearly 40,000 visitors per year. Developing an educational center on the Montezuma Ranch site, combined with displaying and interpreting the national memorial's themes at the visitor center, would reduce congestion and improve the visitor experience. Congestion also would be reduced, especially at high visitation times, by the addition of a group picnic area.

Building roads and constructing facilities and trails would increase the possibility of adversely affecting the viewshed, but vegetative screening and design planning would mitigate adverse impacts on the visitor experience, so that the long-term adverse effects would be minor.

Noise from construction equipment and the temporary closure of some areas would result in short-term minor to moderate adverse effects on the visitor experience. After facilities were expanded, more visitors would be accommodated and crowding reduced, improving visitor understanding and the visitor experience, a moderate to major beneficial effect.

Cumulative Effects

The cumulative effects of alternative D on the visitor experience would be similar to those described for alternative A.

Conclusion

Under alternative D, access via memorial trails to natural resources and cultural exhibits for visitors with disabilities would increase, resulting a negligible to minor beneficial effect. Expanding the visitor center would result in short-term minor to moderate impacts on the visitor experience, but visitor congestion would decrease as a result of the added developments, resulting in long-term moderate to major beneficial effects on the visitor experience.

Improving interpretive materials and expanding the outreach programs that would emphasize the mission, purpose, and significance of the national memorial would enhance the opportunities for visitors to learn about and understand the memorial's resources, a moderate to major beneficial effect on the visitor experience. The new developments would affect the viewshed, resulting in long-term minor adverse impacts on the visitor experience. Eliminating grazing from the Montezuma allotment would benefit a small number of visitors who would use the trails in the grasslands, resulting in a negligible to minor beneficial effect on the visitor experience.

ALTERNATIVE E

Analysis

Access to Resources. Eliminating grazing from the Joe's Spring allotment would enable people to visit grassland habitats that previously were little used by visitors. The beneficial effect on visitor understanding and the visitor experience from closing the allotment to grazing would be negligible to minor because only a small percentage of the people who visit the memorial hike the trails. Likewise, developing three new trails in the grasslands would result in negligible to minor long-term beneficial effects on the visitor experience because only a small portion of visitors to the memorial use the trails.

Building a new visitor center north of the main road would make possible a panoramic view of the landscape and the valley, adding a major attraction that could offer visitors an opportunity to understand and appreciate the human and natural history of the memorial. Adding a paved road leading to the new visitor center would offer access to an area not previously accessible by vehicles, which would benefit most visitors, a long-term moderate to

major beneficial effect on visitor understanding and the visitor experience.

Adding more parking for buses and recreational vehicles would reduce congestion, resulting in negligible beneficial effects on the visitor experience, which would vary depending on the level of visitation.

Interpretation and Orientation. Emphasizing work with various groups to tell the national memorial's international stories and reach beyond the boundary would result in a minor beneficial effect on the visitor experience similar to that described for alternative C.

Visitor Numbers and Recreation. As the actions in this alternative are implemented, visitation numbers could gradually increase to nearly 40,000 visitors per year. Developing a visitor/educational center to display and interpret the national memorial's themes would accommodate more visitors and reduce congestion, improving the visitor experience, a long-term moderate to major beneficial effect. Designing the visitor center to blend into the environment and siting it so as to preserve the views from Montezuma Pass into the San Pedro Valley would minimize adverse effects on the viewshed, making the long-term adverse effects on recreation negligible. Removing the Montezuma Ranch structures and restoring and revegetating the area would enable visitors to enjoy an uninterrupted view of the San Pedro Valley from the Montezuma Peak scenic lookout, improving scenic values, a long-term minor to moderate beneficial effect on the visitor experience.

Cumulative Effects

The cumulative effects of alternative E on the visitor experience would be similar to those described for alternative A.

Conclusion

Under alternative E, access via memorial trails to natural resources and cultural exhibits for visitors with disabilities would increase, resulting in minor beneficial effects. The new, larger visitor/educational center would help to disperse visitors and alleviate congestion, a long-term moderate to major beneficial effect on visitor understanding and the visitor experience. Emphasizing the memorial's interpretive themes through outreach programs alone would result in a minor beneficial effect on the visitor experience.

The new developments that would affect the viewshed would result in long-term negligible adverse impacts on the visitor experience. Eliminating grazing from the Joe's Spring allotment would benefit a small number of visitors, a negligible to minor beneficial effect on the visitor experience.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

There would not be any irreversible or irretrievable commitment of resources that would affect the visitor experience.

RELATIONSHIPS OF SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

Constructing roads, trails, or visitor and operational facilities; demolishing structures, and revegetating areas could cause noise or the closure of areas in the short term, which would result in slight short-term adverse effects on the visitor experience. However, in the long term much of this work would conserve resources and enhance the preservation and interpretation of the memorial's resources, causing long-term beneficial effects. This would be true for all

alternatives, with the greatest effect brought about by alternative B.

Developing various partnerships would result in public appreciation and preservation of the memorial's resources, a long-term minor to moderate beneficial effect. Alternative B or D would result in the greatest of these benefits.

ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

Energy requirements would increase with the construction of new structures. This would be mitigated by designing all structures to be energy-efficient. Alternatives D and E would require the most energy of all the alternatives because of the number of structures that would be maintained and used.

UNAVOIDABLE ADVERSE IMPACTS

The experience of recreational users under alternative A would be degraded over time as recreational use in the national memorial continued to increase without improvements in the quality and maintenance of visitor facilities and recreational opportunities. The visitor experience could be adversely affected by developing educational and visitor centers, trails, or roads in the viewshed, particularly the view from Montezuma Pass. These adverse effects would be negligible under alternatives D and E because the new facilities, roads, and trails would be designed to blend in with the natural landscape.

EFFECTS ON THE SOCIOECONOMIC ENVIRONMENT

ALTERNATIVE A

Recreational Use

Analysis. With few improvements in recreational facilities in the national memorial under alternative A, participation in recreational activities would increase at a rate approximately equal to the increases in visitation. Visitors would continue to hike, go to the visitor center, picnic, go birding, or go spelunking.

As the overall visitation to the national memorial increased, not adding improvements would lead to the deterioration of facilities and attractions through overuse and deferred maintenance as funds were diverted to recreation-serving priorities. This might cause a decrease in visitation as the memorial became a less appealing recreation site. This adverse long-term effect on recreational use would not be distinguishable from other factors that could cause changes in the number of visits or the amount spent per recreation visit. Therefore, it would have a negligible effect on both a countywide and local basis.

Cumulative Effects. Coronado National Forest serves local and regional recreational demand on lands adjacent to the memorial. As recreational use in the area continued to increase under the no-action alternative, the pressures on the national forest also would increase. Minor deterioration of the recreational experience in the national memorial might displace recreationists to the national forest, causing increased use of the forest. However, because federal lands with public access are widely available in Cochise County and throughout the state, this would have a negligible effect on recreational use.

Conclusion. Recreational use at the national memorial under alternative A would be relatively small in proportion to the total recreational demand and recreational opportunities both in Cochise County and throughout the Southwest. The effects of this alternative on recreational use would be negligible both locally and regionally.

Grazing

Analysis. Continuing grazing in the national memorial under alternative A would not result in any economic changes relating to grazing fees or cattle production. Because the number of cattle grazing in the memorial would not change, the economic effect of this alternative on grazing would be negligible.

Cumulative Effects. Cattle production in Cochise County has been declining in recent years, and the contribution of grazing to the local economy has likewise been diminishing. Implementing alternative A would not reduce grazing opportunities in the county and would not contribute to the cumulative effects of a reduction in local or regional grazing revenues.

Conclusion. The long-term effects of grazing on the socioeconomic environment under alternative A would be negligible.

Local and Regional Economy

Analysis. Coronado National Memorial contributes to the local and regional economy by employing people and by attracting visitors from the local area and from outside the region, including the entire United States and Mexico. Approximately 90,000 visitors to the memorial in 2000 spent about $l81.50 per person per day (1995 data), adding about $7.3 million to the local economy. This level of visitation generates about 47 local-area jobs. It also contributes to the local economy through the direct employment of 12 full-time equivalent positions at the memorial.

In the past 20 years, visitation at the memorial increased from 47,825 in 1981 to 89,523 in 2000, (an increase of 87%). For this socioeconomic analysis of alternative A, it was assumed that the increase has been linear throughout this period and that visitation will continue to increase at the same rate. Using this approach, visitation would increase by about 65% during the 15- to 20-year life of this *General Management Plan*. This would produce annual visitation of about 150,000 in the year 2017. The national memorial would have a staff of about 20 people, and about 78 local-area jobs would be generated by visitation. In 1995 dollars, increases in visitation would add about $5 million in sales to Cochise County. These changes would have a negligible effect on the county's economy. The increase in 38 jobs generated directly (7) and indirectly (31) by the memorial would represent less than 0.1% of the employment of the county in 2000. Likewise, $5 million in additional spending would represent only about 0.07% of sales in the county in 2000.

This no-action alternative would result in negligible adverse effects on community services such as schools, sewers, water, and police. The demand for these services related to increased visitation at the memorial would be readily accommodated in a county that grew by 20% in the past decade. Tax revenues from new jobs and from purchases from retail merchants and restaurants by additional visitors would offset the costs of the additional services.

NPS staff members often are trained in fighting wildland fires, and the memorial already cooperates with the U.S. Forest Service in fire protection. The addition of seven trained personnel at the memorial would result in a minor long-term beneficial effect on wildland fire control in the county.

Cumulative Effects. Under the no-action alternative, actions at the national memorial would have negligible effects on social services and the economy of nearby communities and the county.

Conclusion. New jobs and visitor spending associated with alternative A would have negligible effects on the economy. The ability to provide additional personnel trained in fighting wildland fires would be a minor long-term beneficial effect on the region.

ALTERNATIVE B

Recreational Use

Analysis. It is assumed that improved facilities and opportunities at Coronado National Memorial under alternative B would increase visitation in 2017 by 25%, compared to the no-action alternative (A). This would include visits to the memorial and visitor participation in offsite opportunities such as cultural festivals and regional ecosystem preservation activities. The socioeconomic effects of this level of recreation compared to the no-action alternative are shown in table 13.

Using this assumption, the national memorial and its outreach programs would lead to approximately 188,000 visits or recreation-days per year, compared to about 150,000 under the no-action alternative. The visitor service enhancements, resource conservation measures, and outreach programs included in alternative B would enable the memorial to handle this level of recreation without reducing the quality of recreation experienced by visitors. The ability to accommodate an additional 38,000 recreational visits per year compared to the no-action alternative would be a moderate long-term beneficial effect on recreation use in Cochise County.

TABLE 13: SOCIOECONOMIC EFFECTS OF THE ALTERNATIVES IN 2017

	Alternative				
Feature	**A**	**B**	**C**	**D**	**E**
Visitation increase compared to no-action alternative	—	25%	25%	50%	50%
Annual visitation	150,000	188,000	188,000	225,000	225,000
Memorial employment (FTE)	20	29.5	25	29.5	29.5
Indirect jobs from visitation (FTE)	78	98	98	117	117
Spending by visitors (1995 dollars)	$12.3 million	$15.4 million	$15.4 million	$18.4 million	$18.4 million
Grazing level (AUMs)	340	0	0	214	126
Implementation cost (2000 dollars)	—	$2 million	$1.6 million	$3.6 million	$4.7 million
Annual cost for labor and materials (first 5 years only)	—	$400,000	$320,000	$720,000	$940,000

Cumulative Effects. The national memorial's increased capacity to provide recreational opportunities would help accommodate some of the increased demand for recreation that is expected to occur in Cochise County and southern Arizona over the next 15 years. Because of the improvements from alternative B, visitation would not be limited to the extent that visitors would seek other recreation opportunities such as visits to the nearby Coronado National Forest. In addition, by educating more visitors to the values of the natural and human history of the area, alternative B would help reduce the effects of the increasing demand for recreation throughout the area. Cumulatively with other nearby recreation facilities, the actions of alternative B would result in minor long-term beneficial effects on recreational use in the area.

Conclusion. Alternative B, the preferred alternative, would result in moderate long-term beneficial effects on recreation by accommodating more recreation than alternative A.

Grazing

Analysis. Ending grazing in the Joe's Spring and Montezuma allotments would eliminate 340 AUMs of grazing capacity, which the ranchers would be unable to replace. However, this 340 AUMs of grazing capacity amounts to only a tiny portion of the forage needed to support the current livestock population of Cochise County (74,250–82,500 head of cattle). In addition, cattle production represents just a small part of the county's diverse economy. Although eliminating 340 animal unit months of grazing capacity would be an adverse effect on the individual ranchers affected, the economic effect both locally and on a countywide basis would be negligible.

Closing the grazing allotments would reduce conflicts between cattle and national memorial visitors and would facilitate the placement of recreational amenities in the parts of the memorial previously used for grazing. This would contribute to an overall increase in the memorial's ability to offer recreational opportunities, resulting in a minor beneficial effect on recreational use.

Grazing fees paid to the National Park Service represents a small percentage of the national memorial's annual operating budget. Therefore ending the payment of grazing fees to the National Park Service would be a negligible

adverse effect on the memorial's operating budget.

Cumulative Effects. A century ago, cattle production, along with mining, provided the economic foundation of Cochise County. However, the importance of cattle production has diminished as the human population has grown and other sources of income have been developed. Regardless of actions taken by the national memorial, rangelands will continue to be converted to other uses, cattle production in the county will continue to decline, and the percentage that ranching contributes to the county economy will diminish. Implementing alternative B would make a negligible contribution to this decline.

Conclusion. Ending grazing in the national memorial would result in a negligible adverse effect on the county's economy from reduced cattle production.

Local and Regional Economy

Analysis. If visitation to the national memorial increased 25% by 2017 under alternative B, compared to alternative A, annual spending by visitors would be about $15.4 million, or about $3 million more than visitor spending under alternative A. The memorial would have 9.5 more staff members and would indirectly produce 20 additional local area jobs compared to the no-action alternative. These changes, which would increase employment and sales in the county by less than 0.1% of the year 2000 values, would have a negligible beneficial effect on the economy of Cochise County. The demand for community services such as schools, sewers, water, and police would result in a negligible adverse effect compared to alternative A. Tax revenues from the new jobs and retail and restaurant purchases by the additional visitors would offset the costs of the added services.

The facility construction, rehabilitation, and revegetation called for by alternative B would involve costs of slightly more than $2 million for labor and materials. That amount would be spent over 15 years, with most of the construction taking place in the first 5 years. In addition, in the first 5 years about $400,000 per year would be spent for labor and materials. Most of these funds probably would be spent in Cochise County and the surrounding region. These expenditures, which would represent less than 0.1% of the county's year 2000 sales, would have a negligible short-term beneficial effect on the economy of Cochise County. Construction employment in Cochise County is approximately 1,200 (Arizona DES 2001). The construction activity required to implement alternative B would be within the capabilities of the local construction labor force.

Closing the grazing allotments in the national memorial would reduce grazing production by 340 AUMs per year. Currently a 6- to 8-month-old weaned calf sells for $250 (heifer) to $350 (steer) (Ax and Armer 1993). Grazing in the two allotments would produce approximately 50 such calves annually. The loss of this production capacity would result in a long-term negligible adverse effect on the county economy of about $12,500 to $17,500 (50 calves x cost per calf).

NPS staff members often are trained in fighting wildland fires, and the memorial already cooperates with the U.S. Forest Service in fire protection. The addition of nine trained personnel at the memorial compared to the no-action alternative would have a minor long-term beneficial effect on wildland fire control in the county.

Cumulative Effects. Cochise County has a diverse economy that employed about 38,000 people in 2000 and produced sales of about $700 million. The growing population of southern Arizona and national economic trends will drive socioeconomic conditions in the county, with little effect from the amount contributed by Coronado National Memorial. During the first five years, alternative B would add 10 to 12 jobs to the local economy,

compared to the no-action alternative. After the construction phase was completed, this number would drop to about 5 additional jobs. This would be a negligible beneficial effect when compared to the total employment in Cochise County.

Conclusion. Implementing alternative B would result in negligible beneficial effects on the economy of Cochise County compared to alternative A. These effects would result from the direct and indirect creation of local jobs, increased spending associated with more visitation, and expenditures on construction labor and supplies. Negligible adverse effects would result from decreased cattle production. The addition of NPS staff trained in wildland fire suppression would result in a minor long-term beneficial effect on wildland fire control in the county.

ALTERNATIVE C

Recreational Use

Analysis. Improved facilities and opportunities at Coronado National Memorial under alternative C would increase visitation in 2017 by 25%, compared to the no-action alternative (A). This would include visits to the memorial and visitor participation in offsite opportunities generated through outreach programs. The socioeconomic effects of this level of recreation compared to the no-action alternative are shown in table 13, page 221.

The effects on local and regional recreation from implementing alternative C would be similar to those described for alternative B. The visitor service enhancements, resource conservation measures, and outreach efforts included in alternative C would enable the memorial to manage this level of recreation without adverse effects on the quality of recreation experienced by visitors. The memorial's ability to accommodate more recreational use than in alternative A would produce a moderate long-term beneficial effect on recreation in Cochise County.

Cumulative Effects. The cumulative effects from alternative C would be similar to those described for alternative B.

Conclusion. Improvements in facilities and resource conservation brought about by implementing alternative C — increased recreation services, improved facilities, better controls, and enhanced visitor experience — would result in minor long-term beneficial effects on recreation.

Grazing

Analysis. Ending grazing in the two allotments in the memorial would result in the same effects as described for alternative B. Eliminating 340 AUMs of grazing capacity would adversely affect the individual ranchers who would lose that amount of grazing capacity, but the countywide economic effect would be negligible. Eliminating grazing on the memorial's allotments would contribute to an overall increase in the memorial's ability to offer recreational opportunities; however, since no new trails would be developed to facilitate visitor access into the grassland areas, the beneficial effect on recreational use would be negligible. The effect of ending the payment of grazing fees to the National Park Service would be similar to that described for alternative B and would have a negligible adverse effect on the memorial's operating budget.

Cumulative Effects. Eliminating grazing from the national memorial would slightly reduce the number of cattle raised annually in Cochise County. Although the individual ranchers would be adversely affected, the countywide economic effect from alternative C would be negligible.

Conclusion. Eliminating grazing in the national memorial would result in a negligible

long-term adverse effect on the county's economy from reduced cattle production.

Local and Regional Economy

Analysis. If visitation to the national memorial increased by 25% under alternative C by 2017, compared to the no-action alternative, annual spending by visitors would be about $15.4 million, or about $3 million more than visitor spending under alternative A. The memorial would have 5 more staff members and would indirectly produce 20 more local area jobs compared to alternative A. These changes, which would increase employment and sales in the county by less than 0.1% of the year 2000 values, would cause a negligible beneficial effect on the economy of Cochise County. The demand for community services such as schools, sewers, water, and police would result in a negligible adverse effect compared to alternative A. Tax revenues from the new jobs and from retail and restaurant purchases by the additional visitors would offset the costs of the additional services.

The facility construction, rehabilitation, and revegetation called for by alternative C would involve costs of $1.6 million for labor and materials. That amount would be spent over 15 years, with most of the construction taking place in the first 5 years. In addition, in the first 5 years about $320,000 per year would be spent for labor and materials. Most of these funds probably would be spent in Cochise County and the surrounding region. The level of construction brought about by alternative C would be within the capabilities of the local construction labor force. These expenditures, which would represent less than 0.1% of the county's year 2000 sales, would have a negligible short-term beneficial effect on the economy of Cochise County.

Closing the grazing allotments in the national memorial would reduce grazing production by 340 AUMs per year. This loss of production capacity would be similar to those described for alternative B and would result in a long-term negligible adverse effect on the county economy.

NPS staff members often are trained in fighting wildland fires, and the memorial already cooperates with the U.S. Forest Service in fire protection. The addition of five trained personnel at the memorial compared to the no-action alternative would have a minor long-term beneficial effect on wildland fire control in the county.

Cumulative Effects. During the first five years, alternative C would add 10 to 12 jobs to the local economy, compared to the no-action alternative. After the construction phase was completed, this number would drop to about 5 additional jobs. This would be a negligible beneficial effect when compared to the total employment in Cochise County.

Conclusion. Implementing alternative C would result in negligible beneficial effects on the economy of Cochise County compared to alternative A. These effects would result from the direct and indirect creation of local jobs, increased spending associated with increased visitation, and expenditures on construction labor and supplies. Negligible adverse effects would result from decreased cattle production. The addition of NPS staff trained in wildland fire suppression would result in a minor long-term beneficial effect on wildland fire control in the county.

ALTERNATIVE D

Recreational Use

Analysis. Improved opportunities and facilities added to the national memorial under alternative D (a new educational center, the commemorative feature) would increase visitation in 2017 by 50%, compared to the no-action alternative. This would include visits to the memorial and visitor participation in offsite opportunities such as Coronado-related events at various universities. The

socioeconomic effects of this level of recreation compared to alternative A are shown in table 13, page 221.

Using this assumption, the national memorial and its outreach programs would provide about 225,000 visits or recreation-days per year, compared to about 150,000 in alternative A. The enhanced visitor services, resource conservation measures, and outreach efforts included in alternative D would enable the memorial to accommodate this increased visitation without adverse effect to the quality of recreation experienced by visitors. The ability to accommodate the increased recreational use compared to the no-action alternative would result in a moderate long-term beneficial effect on recreation in Cochise County.

Cumulative Effects. The cumulative effects on recreational use from alternative D would be similar to those described for alternative A.

Conclusion. Implementing alternative D, which would involve more recreational opportunities than alternative A, would result in moderate long-term beneficial effects on recreational use.

Grazing

Analysis. Eliminating grazing from the Montezuma allotment would remove 126 AUMs of grazing capacity from the memorial, and the ranchers who would lose this grazing capacity would not be able to replace it. The 126 AUMs of grazing capacity is only a small portion of the grazing required to support the current livestock population of Cochise County (74,250–82,500 head of cattle). Although eliminating these AUMs would have an adverse effect on individual ranchers, the countywide adverse effect would be negligible. Eliminating grazing fees to the National Park Service for the Montezuma allotment would have a negligible adverse effect on the memorial's operating budget.

Ending grazing in the Montezuma allotment would reduce conflicts between visitors and cattle and enable the National Park Service to place recreational amenities south of the main road, including an educational center and a commemorative feature. This would allow the national memorial to offer more recreational opportunities, resulting in a minor beneficial effect on recreational use.

Cumulative Effects. Regardless of actions taken in the memorial, cattle production in the county would continue to decline, both in the number of cattle produced and its percentage of contribution to the county economy. Eliminating 126 AUMs under alternative D would make a negligible contribution to this decline.

Conclusion. Eliminating grazing from the Montezuma allotment would result in a minor long-term beneficial effect on recreational use and a negligible adverse effect on the county's economy from reduced cattle production.

Local and Regional Economy

Analysis. If visitation to the national memorial increased by 50% under alternative D by 2017, compared to the no-action alternative, annual spending by visitors would be about $18.4 million, or about $6 million more than visitor spending under alternative A. The memorial would have 10 more staff members and would indirectly produce 39 additional local area jobs compared to the no-action alternative. These changes, which would increase employment and sales in the county by less than 0.1% of the year 2000 values, would result in a negligible beneficial effect on the economy of Cochise County. The demand for community services such as schools, sewers, water, and police would result in a negligible adverse effect compared to alternative A. Tax revenues from the new jobs and retail and restaurant purchases by the additional visitors would offset the costs of the added services.

The facility construction, rehabilitation, and revegetation called for by alternative D would

involve costs of $3.6 million for labor and materials. That amount would be spent over 15 years, with most of the construction taking place in the first 5 years. In addition, in the first 5 years about $720,000 per year would be spent for labor and materials. Most of these funds probably would be spent in Cochise County and the surrounding region. The level of construction brought about by alternative D would be within the capabilities of the local construction labor force. These expenditures, which would represent less than 0.1% of the county's year 2000 sales, would have a negligible short-term beneficial effect on the economy of Cochise County.

Eliminating grazing from the Montezuma allotment would reduce grazing production by 126 AUMs per year. This loss of production capacity would result in a long-term negligible adverse effect on the county economy of about $4,500 to $6,300 (18 calves x cost per calf).

NPS staff members often are trained in fighting wildland fires, and the memorial already cooperates with the U.S. Forest Service in fire protection. The addition of ten trained personnel at the memorial compared to the no-action alternative would have a minor long-term beneficial effect on wildland fire control in the county.

Cumulative Effects. Cochise County has a diverse economy that employed about 38,000 people in 2000 and produced sales of about $700 million. The growing population of southern Arizona and national economic trends will drive socioeconomic conditions in the county, with little effect from the amount contributed by Coronado National Memorial. Alternative D would result in a negligible beneficial effect on the total economy of Cochise County.

Conclusion. Implementing alternative D would result in negligible beneficial effects on the economy of Cochise County compared to alternative A. These effects would result from the direct and indirect creation of local jobs, increased spending associated with more visitation, and expenditures on construction labor and supplies. Negligible adverse effects would result from decreased cattle production. The addition of NPS staff trained in wildland fire suppression would result in a minor long-term beneficial effect on wildland fire control in the county.

ALTERNATIVE E

Recreational Use

Analysis. Improved facilities such as the new visitor center and opportunities at Coronado National Memorial under alternative E would increase visitation in 2017 by 50%, compared to alternative A. This would include visits to the memorial and visitor participation in offsite opportunities. The socioeconomic effects of this level of recreation compared to alternative A are shown in table 13, page 221.

Using this assumption, the national memorial and its outreach programs would provide approximately 225,000 visits or recreation-days per year, compared to about 150,000 under the no-action alternative. The improved facilities, enhanced visitor services, resource conservation measures, and outreach programs that would be included in alternative E would enable the memorial to accommodate this increased visitation without reducing the quality of recreation experienced by visitors. The ability to accommodate the increased level of recreational use compared to the no-action alternative would cause a moderate long-term beneficial effect on recreation in Cochise County.

Cumulative Effects. The cumulative effects on recreational use from alternative E would be similar to those described for alternative A.

Conclusion. Alternative E would result in more recreation opportunities than would be available under alternative A; this would be a moderate long-term beneficial effect on recreational use.

Grazing

Analysis. Ending grazing in the Joe's Spring allotment would remove 214 AUMs of grazing capacity from the memorial, and the ranchers who would lose this grazing capacity would be unable to replace it. The 214 AUMs of grazing capacity is only a small portion of the grazing required to support the current livestock population of Cochise County (74,250–82,500 head of cattle). Although eliminating these AUMs would have an adverse effect on individual ranchers, the countywide effect would be negligible. Ending the payment of one allotment's grazing fees to the National Park Service would be a negligible adverse effect on the memorial's operating budget.

Eliminating grazing from the Joe's Spring allotment would reduce conflicts between visitors and cattle and would enable the National Park Service to place recreational amenities north of the main road, including a new visitor center. This would allow the national memorial to offer more recreational opportunities, resulting in a minor beneficial effect on recreational use.

Cumulative Effects. Regardless of actions taken in the memorial, cattle production in the county would continue to decline, both in the number of cattle produced and its percentage of contribution to the county economy. Eliminating 214 AUMs under alternative E would make a minor contribution to this decline.

Conclusion. Ending grazing in the Joe's Spring allotment would cause a minor long-term beneficial effect on recreational use and a negligible adverse effect on the county's economy from reduced cattle production.

Local and Regional Economy

Analysis. If visitation to the national memorial increased by 50% under alternative E by 2017, compared to the no-action alternative, annual spending by visitors would be about $18.4 million, or about $6 million more than visitor spending under alternative A. The memorial would have 10 more staff members and would indirectly produce 39 additional local area jobs compared to the no-action alternative. These changes, which would increase employment and sales in the county by less than 0.1% of the year 2000 values, would have a negligible beneficial effect on the economy of Cochise County. The demand for community services such as schools, sewers, water, and police would increase, resulting in a negligible adverse effect. Tax revenues from the new jobs and from retail and restaurant purchases by the added visitors would offset the costs of the additional services.

The facility construction, rehabilitation, and revegetation called for by alternative E would involve costs of $4.7 million for labor and materials. That amount would be spent over 15 years, with most of the construction taking place in the first 5 years. In addition, in the first 5 years about $940,000 per year would be spent for labor and materials. Most of these funds probably would be spent in Cochise County and the surrounding region. The level of construction in alternative E would be within the capabilities of the local construction labor force. These expenditures, which would represent less than 0.1% of the county's year 2000 sales, would have a negligible short-term beneficial effect on the economy of Cochise County.

Eliminating grazing from the Joe's Spring allotment would reduce grazing production by 214 AUMs per year. This loss of production capacity would result in a long-term negligible adverse effect on the county economy of about $8,000 to $11,200 (32 calves x cost per calf).

NPS staff members often are trained in fighting wildland fires, and the memorial already cooperates with the U.S. Forest Service in fire protection. The addition of ten trained personnel at the memorial compared to the no-action alternative would have a

minor long-term beneficial effect on wildland fire control in the county.

Cumulative Effects. Cochise County has a diverse economy that employed about 38,000 people in 2000 and produced sales of about $700 million. The growing population of southern Arizona and national economic trends will drive socioeconomic conditions in the county, with little effect from the amount contributed by Coronado National Memorial. Alternative E would result in a negligible beneficial effect on the total economy of Cochise County.

Conclusion. Implementing alternative E would result in negligible beneficial effects on Cochise County's economy compared to alternative A. These effects would result from the direct and indirect creation of local jobs, increased spending associated with increased visitation, and expenditures on construction labor and supplies. Negligible adverse effects would result from decreased cattle production. The addition of NPS staff trained in wildland fire suppression would result in a minor long-term beneficial effect on wildland fire control in the county.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Implementing alternative A would not result in any additional commitment of resources to new activities or programs other than those already underway. The funds that would be expended under alternatives B, C, D, and E for construction materials and for labor needed to construct facilities and operate the programs would be irreversibly and irretrievably committed. The resources committed would vary by alternative, with the greatest expenditures being made under alternatives D and E.

RELATIONSHIPS OF SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

Constructing roads, trails, or visitor and operational facilities; demolishing structures, and revegetating areas could result in minor short-term adverse impacts on recreational use. However, in the long term facilities and programs would be enhanced, resulting in minor to moderate beneficial effects on recreation. Alternatives B and E would result in the most favorable overall net benefits.

Continuing recreational use and visitor activities without improvements at the memorial under alternative A would reduce the long-term productivity of the socioeconomic environment over the long term.

ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

Energy requirements would increase with the construction of new structures. This would be mitigated by designing all structures to be energy-efficient. Alternatives D and E would require the most energy of all the alternatives because of the number of structures that would be maintained and used.

UNAVOIDABLE ADVERSE IMPACTS

The experience of recreational users under alternative A would be degraded over time as recreational use in the national memorial continued to increase without improvements in the quality and maintenance of visitor facilities and recreational opportunities. With increases in the local population and out-of-area visitation to the memorial, the conflicts between livestock and visitors would continue and worsen. Eventually this would lead to reduced socioeconomic benefits locally and regionally. Continued grazing under alternatives A, D, and E would result in minor long-term adverse effects on socioeconomic conditions related to recreation use.

Discontinuing grazing under alternatives B and C would result in the loss of grazing fees.

CONSULTATION AND COORDINATION

INVOLVEMENT OF PUBLIC AND OTHER AGENCIES

PUBLIC INVOLVEMENT

This *General Management Plan / Environmental Impact Statement* for Coronado National Memorial represents thoughts presented by the National Park Service, Native American groups, and the public. Consultation and coordination among the agencies and the public were vitally important throughout the planning process. The public had two primary avenues by which it participated during the development of the plan: participation in public meetings and responses to newsletters.

Public meetings and newsletters were used to keep the public informed about and involved in the planning process for Coronado National Memorial. A mailing list was compiled that consisted of members of governmental agencies, nongovernmental groups, businesses, legislators, local governments, and interested citizens.

The notice of intent to prepare an environmental impact statement was published in the *Federal Register* on February 22, 2000. A newsletter issued in March 2000 described the planning effort. Public meetings in Sierra Vista and Bisbee in April 2000 were attended by 30 people. The National Park Service also met with city, county, and federal agencies. The National Park Service received several comments about the meetings and newsletter, and a number of these comments were incorporated into the issues for the plan.

A second newsletter distributed in March 2001 described draft alternative concepts for managing the national memorial. A total of 22 electronic and mailed comments were received in response to that newsletter. Several letters favored making only minimal changes to the current management of the memorial. Some people expressed concern about overdevelopment. Some people commented in favor of the memorial offering more educational opportunities for visitors and facilities to support these activities; others said they would like more trails in the national memorial, and some said there should be less grazing in the memorial.

A third newsletter issued in June 2001 described alternatives for grazing at Coronado National Memorial and asked if people thought any of the memorial was suitable for wilderness designation. A wide range of opinions was received in 38 electronic and mailed comments. Some people wrote in favor of allowing grazing in whole or in part; others commented in favor of eliminating all grazing from the memorial. Some commenters said they favored formal wilderness designations; others wrote to oppose any wilderness designation.

A fourth newsletter published in February 2001 explained the National Park Service's determination regarding wilderness and the possible range of actions on grazing.

CONSULTATION

Section 106 Consultation

Agencies that have direct or indirect jurisdiction over historic properties are required by section 106 of the National Historic Preservation Act of 1966, as amended (16 USC 270, et seq.), to take into account the effect of any undertaking on properties eligible for the National Register of Historic Places. Such agencies also must allow the Advisory Council on Historic Preservation an opportunity to comment. To meet the requirements of 36 CFR 800, the National Park Service sent letters to the Arizona state historic preservation office and the Advisory Council on Historic Preservation on March 7, 2000, inviting their participation in the planning process. Both offices were sent all the newsletters with a request for comments.

Representatives from the Arizona state historic preservation office visited Coronado National Memorial on June 6, 2001, and were briefed on alternatives for the *Draft General Management Plan / Environmental Impact Statement*. The sites visited were the Montezuma Ranch, Montezuma Pass, the visitor center, the housing area, and the picnic area. The representatives of that office indicated that for the purposes of this plan, the visitor center should be considered eligible for listing on the national register, but that the other sites would require further evaluation.

Consultation with American Indians

Letters were sent to the following American Indian groups on March 22, 2000, to invite their participation in the planning process:

- Ak-chin Indian Community
- Fort McDowell Mojave-Apache Indian Community
- Fort Sill Apache Tribe of Oklahoma
- Hopi Tribe
- Mescalero Apache Tribe
- Pascua Yaqui Tribe of Arizona
- Pueblo of Zuni
- Salt River Pima-Maricopa Indian Community
- San Carlos Apache Tribe
- Tohono O'odham Nation
- Tonto Apache Tribe
- White Mountain Apache Tribe
- Yavapai-Apache Tribe

The tribes were briefed on the scope of the planning project and the preliminary alternatives by newsletters and follow-up telephone calls soliciting comments. Comments included a letter from the Hopi Tribe and oral comments from other tribes. These comments included expressions of concern that recreation not be over-emphasized at the memorial and that any traditional cultural properties in the area be respected. Conversations have been continuing throughout the planning process to inform the tribes about the progress of the plan and identify how and to what extent they would like to be involved. The listed tribes were sent a copy of the *Draft General Management Plan / Environmental Impact Statement*. This was followed by telephone calls to the tribes. There were no comments from the tribes at this time.

Consultation Regarding Threatened or Endangered Species

Consultation with the U.S. Fish and Wildlife Service began in March 2000, when the National Park Service requested a list of endangered and threatened species that might be found in or near Coronado National Memorial. The U.S. Fish and Wildlife Service responded on March 27, 2000 with a list of the endangered or threatened species that might be found there. This response is included in appendix F.

Consultation with Other Agencies

Representatives of the national memorial met on April 4, 2000, with and representatives of the United State Border Patrol, Coronado National Forest, Fort Huachuca, the Bureau of Land Management, and the Cochise County Planning Department. The scope and issue of the plan were discussed, and these agencies were placed on the mailing list so that they would receive all newsletters for comment.

PUBLISHING THE DRAFT DOCUMENT

A notice of availability of the draft document was published in the *Federal Register* on August 6, 2003 (FR Vol. 68, No. 151). About 500 copies of the draft were distributed to government agencies, public interest groups, and individuals. In addition, the complete text of the *Draft General Management Plan/ Environmental Impact Statement* was posted on the NPS Web site.

AGENCIES AND ORGANIZATIONS RECEIVING COPIES OF THIS DOCUMENT

International Agencies

International Boundary and Water Commission*

Federal Officials and Agencies

Advisory Council on Historic Preservation*
Fort Huachuca
U.S. Army Corps of Engineers
U.S. Department of Agriculture
  Forest Service
  Natural Resource Conservation Service
U.S. Border Patrol
U.S. Department of the Interior
  Bureau of Land Management
  U.S. Fish and Wildlife Service*
U.S. Environmental Protection Agency*

State Officials and Agencies

Governor Jane Dee Hull
Senator Jon Kyl
Senator John McCain
Representative Jim Kolbe
Arizona Department of Environmental Quality
Arizona Department of Parks and Tourism
Arizona Game and Fish Commission
Arizona Highway and Transportation Department
Arizona State Historic Preservation Office
New Mexico Highlands University*

Local Agencies

Cochise County, Planning Department*

Organizations

American Lands Alliance*

American Indians

Ak-chin Indian Community
Fort McDowell Mohave-Apache Indian Community
Fort Sill Apache Tribe of Oklahoma
Hopi Tribe
Mescalero Apache Tribe
Pascua Yaqui Tribe of Arizona
Pueblo of Zuni
Salt River Pima-Maricopa Indian Community
San Carlos Apache Tribe
Tohono O'odham Nation
Tonto Apache Tribe
White Mountain Apache Tribe
Yavapai-Apache Tribe

Individuals

Curt Bradley, Martin Taylor, Tim Lengerich, Alexander "Sandy" Kunzer, Steve Saway*
Jeff Burgess*
Dieter Kamm*
Alice Moffett*
Warren and Barbara North*

*An asterisk denotes those who commented on the draft plan.

REVIEW AND COMMENTS ON THE DRAFT DOCUMENT

This section contains a summary of comments received through a public meeting, letters, and e-mail after the *Draft General Management Plan/Environmental Impact Statement* for Coronado National Memorial was released on August 6, 2003. The National Park Service considered all written and oral comments according to the requirements of 40 CFR 1503.

COMMENTS

A public meeting was held in September 2003 at Sierra Vista. There were four people at this meeting. In general, the comments at the public meetings sought clarification of the various alternatives with some discussion on the pros and cons of each alternative. Other comments were in regard to why the memorial would not allow camping.

During the comment period (August 6 through October 6, 2003), 10 comment letters and six electronic responses were received commenting on the draft from governing bodies, government agencies, organized interest groups, and individuals. All comments are reproduced on the following pages. The comments, in general, expressed support for either or both the preferred alternative or alternative C. A number of comments supported the proposal to end grazing, saying that both the visitor experience and natural resources would benefit. Some comments suggested that the natural resource benefits could be greater than predicted in the environmental consequences section of the draft document. The following are NPS response to substantive comments and suggestions for modifications of the draft plan. A substantive comment requiring response must meet one of the following criteria found in the regulations that implemented the National Environmental Policy Act (section 1503.4.1-5):

(1) Modify alternatives including the proposed action.
(2) Develop and evaluate alternatives not previously given serious consideration by the agency.
(3) Supplement, improve, or modify its analysis.
(4) Make factual corrections.
(5) Explain why comments do not warrant further agency responses, citing the sources, authorities, or reasons which support the agency's position and, if appropriate, indicate those circumstances which would trigger agency reappraisal or further response.

Comment from the U.S. Fish and Wildlife Service

During the public comment period, the park followed up the transmittal of the *Draft General Management Plan/Environmental Impact Statement* to the U.S. Fish and Wildlife Service with a telephone conversation. That agency had no comment at that time on the draft plan and may send the National Park Service a letter with that finding.

Comment from American Lands Alliance

"We are disappointed that alternative B does not include a goal of determining the 'feasibility of reintroducing native plants and animals in the memorial that were present at the time of the Coronado Expedition.'"

Response: Alternative B seeks to improve both visitor experience and natural resource habitat while balancing these improvements with the cost of any new programs. Under alternative B the memorial would continue to cooperate with other agencies such as Arizona Game and Fish Department and U.S.

Fish and Wildlife Service on local reintroduction and recovery efforts.

Comment from the Center for Biological Diversity

"Coronado undoubtedly also saw an abundance of wild game. Restoring wild game to pristine levels should likewise be considered part of the memorial's mission."

Response: See above comment. Also, the phasing out of grazing in alternative B will result in some wildlife species having more food and cover. Grasslands habitat for birds and small mammals as well as the animals that prey on them will be improved and may result in increased species diversity. Additional discussion can be found in the environmental consequences section of the plan on how alternative B would affect wildlife habitat and populations.

Comment from Steve Saway

The memorial currently has no area for designated overnight camping.

Response: As stated on page 69 in the draft document, adequate camping for memorial visitors is available outside the national memorial and facilities in the memorial are not necessary to accomplish the memorial's mission.

Comments on Distribution of the Draft Document

A number of people at the public meeting and some letters commented that National Park Service should reduce the number of documents produced and the cost of mailing the documents.

Response: The National Park Service sent out a postcard to people on the mailing list for the *Final General Management Plan/ Environmental Impact Statement* offering the final plan in a printed version, on a compact disk as a PDF file, or as an electronic version that could be downloaded from the NPS planning website at <http://planning.nps.gov/ plans.cfm>. Also a few printed documents were available at the park's visitor center. This helped reduce the number of documents printed and mailed.

Comments on NPS Operations

Several comments were received that made recommendations for various park operational programs. For example, one commenter suggested the park have recycling bins at the visitor center. Although many of these suggestions may have considerable merit, they are too detailed to be included in a general management plan, which is intended to be a long-range, general guidance document. However, these suggestions will be kept and considered as the park moves into more detailed implementation planning. Other comments on NPS operations that were too detailed for a general management plan included the following:

Interpretive activities should look at ways to involve the Hispanic community.

New pullouts and waysides (these are discussed in the preferred alternative) should be provided with garbage cans.

The National Park Service should continue to look at ways to enhance interpretation of the Coronado *entrada* and the Spanish Colonial Period.

The National Park Service should contact the International Boundary and Water Commission if any work is planned on International Boundary Monuments 100, 101, and 102.

INTERNATIONAL BOUNDARY AND WATER COMMISSION
UNITED STATES AND MEXICO

OFFICE OF THE COMMISSIONER
UNITED STATES SECTION

AUG 1 8 2003

RECEIVED

AUG 2 0 2003

CORONADO NATIONAL MEMORIAL

Superintendent
Coronado National Memorial
4101 East Montezuma Canyon Road
Hereford, Arizona 85615

Dear Superintendent:

The United States Section, International Boundary and Water Commission (USIBWC), provides review comments on the Draft General Management Plan/Environmental Impact Statement received August 5, 2003. The document is on management alternatives and potential impacts to natural and cultural resources at the memorial.

International Boundary and Water Commission, United States and Mexico (IBWC), oversees application of numerous boundary and water treaties and related agreements between the Governments of the United States and Mexico. IBWC ensures permanence of the international boundary monumentation along the land boundary located west of El Paso, Texas, including periodic inspection, repair/replacement and re-survey. International agreements specify that activities will not obstruct access to monuments and line-of-sight between them. It is recommended that United States (U.S.) projects, such as border fences and associated works (i.e., excavations, foundations) be on an alignment that is offset a minimum of two feet from the international boundary. Typically, a 10-foot offset and provisions for access are required near the international boundary monuments. Fencing near the international boundary may not reflect the international boundary. The IBWC typically does not place fencing on the boundary. The U.S. Government gives limited technical investigative authority to USIBWC. Based on statutes; under this authority, USIBWC asks that development in the United States near the international land boundary not alter existing surface drainage patterns and characteristics.

Based on National Park Service information, the proposed activities will not limit our access, and will not result in transboundary drainage or pollution impacts. This determination considers USIBWC operation and maintenance activities, and line-of-sight between the monuments. All workers and equipment must remain in the United States. On page 197, regarding International Boundary Monuments 100, 101, and 102 determined eligible for nomination to the National Register of Historic Places, contact the following office two weeks before the start of any work at monuments: Mr. Stephen Tencza, Project Manager, USIBWC Nogales Field Office, 865 Rio Rico Industrial Park, Rio Rico AZ 85648, Phone: (520) 281-1832. International Boundary Monuments

The Commons, Building C, Suite 310 • 4171 N. Mesa Street • El Paso, Texas 79902
(915) 832-4100 • (FAX) (915) 832-4190 • http://www.ibwc.state.gov

are half in the United States and half in Mexico. In accordance with international treaties and United States Federal Law, the IBWC maintains full control of International Boundary Monuments. On page 233, add the USIBWC to the list of federal agencies that received the document.

If you have questions, please call Environmental Protection Specialist Steve Fox at (915) 832-4736.

Sincerely,

for Sylvia A. Waggoner
Division Engineer
Environmental Management Division

S.H.P.O.- 2003 - 575 (16949)

United States Department of the Interior

NATIONAL PARK SERVICE
Coronado National Memorial
4101 East Montezuma Canyon Road
Hereford, AZ 85615

RECEIVED
AUG 11 2003
ARIZONA STATE PARKS/S.H.P.O.

IN REPLY REFER TO:

CORO (H-4217)

August 7, 2003

Mr. James Garrison
State Historic Preservation Officer
Arizona State Parks
1300 West Washington
Phoenix, AZ 85007

CONCUR w/ PROCESS PROPOSED
Robert R Stanley 12 SEP 03
ARIZONA STATE HISTORIC PRESERVATION OFFICER
FOR ARIZONA STATE PARKS BOARD

Dear Mr. Garrison:

The National Park Service continues to work toward the completion and implementation of a General Management Plan/Environmental Impact Statement (GMP/EIS) for Coronado National Memorial in Cochise County, Arizona. A copy of the public review draft of the GMP/EIS is being submitted for your review and formal comment under stipulation VI.E of the 1995 Programmatic Agreement. We would like to present those undertakings subject to review under Section 106 consultation.

The draft document contains five alternatives.

Alternative A reflects ongoing actions at the park and serves as a basis for comparing the other alternatives and knowing why certain changes may be advisable. Current laws, policies, and guidelines would guide natural and cultural resource management actions. Interpretation and visitor services remain limited, and any development that is not tied to an approved plan would be designed to be temporary and reversible. There would be limited, if any, changes in the management of the park. Coordination with agencies and other groups would continue.

Alternative B is the National Park Service's preferred alternative. It would enhance educational and recreational opportunities while ensuring public understanding of the national memorial's resources. Educational and interpretive goals would be emphasized, and the staff would seek new ways to foster public appreciation of the memorial's resources.

Grazing in the national memorial would be discontinued, and the abandoned power line along the road to Montezuma Pass would be removed and revegetated with native plant species. All existing trails would be retained, and four new trails developed along with a new group picnic site and additional parking spaces for four buses or recreation vehicles.
The memorial would develop and update interpretation for the trail from Montezuma Pass to Coronado Peak, the trail to Coronado Cave, and the grasslands north and south of the main road.

Montezuma Ranch would be evaluated for national register eligibility, and any features found eligible would be documented according to procedures developed through consultation with the Arizona state historic preservation office. Then all structures would be removed, the area's natural contours would be restored, and native species would be used to revegetate the area. A trail accessible to people with disabilities would be developed in the grasslands north of the entrance, using part of the windmill road. The memorial's visitor center would be rehabilitated and offer updated interpretation. Interpretation would be available at Montezuma Pass. More pullouts and waysides would be developed along the main road. An annex behind the visitor center would contain additional office space and storage, along with a multipurpose room. A shuttle system would be developed between the visitor center and Montezuma Pass. Also the memorial would work toward creating an offsite cultural festival to celebrate various associated cultures, emphasizing the historical aspects of the Coronado Expedition. A new four-unit structure might be built to house temporary employees. Vegetation would screen all development from the road.

Alternative C would enhance the conservation of the memorial's cultural and natural resources for future generations. Intrusive features on the landscape would be rehabilitated, interpretation, interpretation would be updated, and the outreach program would be strengthened.

The abandoned powerline along the road to Montezuma Pass would be removed and revegetated with native plant species. Studies would be done to determine the feasibility of reintroducing native plants and animals in the memorial that were present at the time of the Coronado Expedition. Grazing would be eliminated from the memorial. The Montezuma Ranch would be evaluated for national register eligibility, then the staff would work toward removing the structures to improve the views. If structures or cultural landscape were found eligible, the staff would consult with the Arizona state historic preservation office to determine what features could be removed or documented and then removed. The goal would be to remove as many of these features as possible, restore the area's natural contours, and revegetate it. Abandoned roads would be restored to natural contours and revegetated. Intensive interpretation would be offered in the Montezuma Pass area and along the Coronado Peak and to Coronado Cave trails.

The interior of the visitor center would be remodeled to make more space for interpretation. The building would be evaluated for its eligibility for national register listing, and any work would be planned to protect the contributing features. The interpretive trail near the visitor center would be made accessible for people with disabilities.

Some staff positions would be relocated in adequate space outside, but near, the memorial to make room for visitors to park at the visitor center. The picnic area and its access road would be retained, with parking added nearby for four buses or recreational vehicles. The dirt storage area on the road to Montezuma Pass would be removed, and that area, along with the former fiesta grounds and social trails, would be restored to natural contours and revegetated. A new four-unit structure might be built to house temporary employees. Vegetation would screen all development from the road.

Strong emphasis would be placed on reaching beyond the memorial's boundaries to improve public understanding of the national memorial. The staff would join forces with various groups to tell the memorial's story. Interpretive programs would be developed with Mexican groups, and activities would support Mexican and American natural and cultural resources.

Alternative D would be to develop a fuller international experience for visitors by finding new ways for the public to appreciate and understand the international aspects of the memorial.

The abandoned power line along the Montezuma Pass road would be removed and the area revegetated with native species. Abandoned roads would be restored to natural contours and revegetated. Grazing would not be permitted in the Montezuma allotment. Interpretive media would be added and update on the trail from Montezuma Pass to Coronado Peak, the trail to Coronado Cave, and the grasslands north of the main road. A new interpretive trail would be developed north of the main road in the grasslands, possibly using the windmill road, but not going into the Joe's Spring allotment.

East Forest Lane would be upgraded to two lanes, and a new structure would be built at the end of that road to offer views into Mexico. In this commemorative feature, which could become a main attraction of the memorial, interpretive media would foster appreciation of the Coronado Expedition, encouraging international amity. An educational center with space for staff offices built in the Montezuma Ranch area would be designed to blend into the environment, with the surrounding area landscaped so that it would not detract from the views from Coronado Peak. The Montezuma Ranch structures would be evaluated for national register eligibility, and any found eligible might be adaptively used as part of the educational center (with consultation with the Arizona state historic preservation office). The structures found ineligible would be demolished.

The views from Montezuma Pass would be preserved, with the roads to the educational center and the commemorative feature designed to minimize harm to the vista. The visitor center would be expanded and rehabilitated, with updated interpretation and more office and storage space. Interpretive themes would relate to the memorial's international aspects.

The interpretive trail at the visitor center would be removed. The visitor center would be evaluated for national register eligibility, and any work would be planned to protect the contributing features. More parking for visitors and NPS staff would be added; some could be in the present picnic area. The road to the picnic area would be upgraded and picnic sites added. A shuttle system would take visitors to and from Montezuma Pass, where the visitor shelter would be converted into a minimal contact station (staffed at peak times) and a sheltered shuttle stop. A new four-unit structure might be built to house temporary employees and others. All development would be screened from the road by vegetation.

The memorial would explore the feasibility of sponsoring Coronado-related events at various universities to promote international understanding. These events might include onsite and offsite lectures and cultural activities.

Alternative E would offer an enhanced experience for visitors while creating a more sustainable national memorial, with the hope of educating the public about the significance of the Coronado Expedition. A new visitor/education center would be created, and a new interpretive trail would be developed.

The abandoned power line along the road to Montezuma Pass would be removed and the area revegetated with native species. Grazing in the Joe's Spring allotment would be ended. East Forest Lane would continue to be used for NPS operations and as an access road to the Montezuma grazing allotment. The Montezuma Ranch would be evaluated for national register eligibility, and any features found eligible would be documented according to procedures recommended through consultation with the Arizona state historic preservation office. Then all structures would be removed, and it would be revegetated with native species. Interpretive media would be developed and updated for the trail from Montezuma Pass to Coronado Peak, the trail to Coronado Cave, and the grasslands north of the main road.

A new visitor/education center, which would be about 1.2 miles west of the east entrance. A trail would be developed at that center to interpret the grasslands, and another trail would be created between the current visitor center and the new visitor and education center. From the new center, visitors would have panoramic views of the San Pedro River Valley and the United States-Mexico border. These views would add to the staff's ability to tell the human and natural stories significant to Coronado National Memorial. The principles of sustainable design would be used to create this building typical of the Spanish colonial period, which would blend into the environment as much as possible.

The present visitor center, which may be eligible for national register listing, would be converted into administrative offices. It would be evaluated for national register eligibility, and any work done on the building would be planned to protect the eligible features. The main road, trailheads, parking, picnic area, and restrooms would be unchanged, with social trails revegetated. The windmill road would be made into a two-lane paved road, with the alignment changed slightly to give access to the visitor/education center. A shuttle system would run between the new visitor center, the old visitor center, and Montezuma Pass, with interpretation offered aboard the shuttles. The visitor shelter at Montezuma Pass would be converted into a minimal contact station and sheltered shuttle stop. A four-unit structure might be added to house temporary employees and others. All development would be screened from the road be vegetation.

The memorial would work with groups to tell the memorial's stories and reach beyond its boundaries. Partnerships would be created with local schools, the U.S. Forest Service, the Bureau of Land Management, and others, and interpretive programs would be developed in conjunction with Mexican groups.

Under the terms of VI.E of the 1995 Programmatic Agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers, the National Park Service, "in consultation with the SHPO, will make a determination about which undertakings are programmatic exclusions under IV. A and B, and all other undertakings, potential effects on those resources to seek review and comment under 36 CFR 800.4-6 during the plan review process."

Proposed undertakings for Coronado National Memorial are discussed in the enclosed *Draft, General Management Plan, Environmental Impact Statement for Coronado National Memorial* on page 243. The action and compliance requirements as proposed by the National Park Service are listed below:

Action	**Compliance Requirement**
Rehabilitate Visitor Center	Further SHPO review necessary
Construct Visitor Center Annex	No further SHPO review unless National Register of Historic Places archeological sites are impacted by construction or location would impact potential cultural landscape.
Develop Trails and Wayside Exhibits	No further SHPO review necessary.
Demolish Montezuma Ranch structures	No further SHPO review unless ranch is determined eligible for the National Register of Historic Places.
Upgrade facilities at Montezuma Pass	No further SHPO review necessary.
Rehabilitation work in housing area	Further SHPO review necessary.

Your comments and concerns are important in determining the future of this national park, and we would very much appreciate having the benefit of your comments before we move on to the next stage of the planning process. Following the public review period, a summary and analysis of comments will be prepared and used by the National Park Service in selecting the final plan that will be implemented. A final GMP/EIS will be prepared and distributed.

Thank you for your participation in the General Management Plan process here at Coronado National Memorial. We look forward to receiving your comments regarding the above determinations. Please direct any oral comments or questions to John Paige (303) 969-2356. We would appreciate any written comments by October 6, 2003. They should be sent to Superintendent, Coronado National Memorial, 4101 East Montezuma Canyon Road, Hereford, Arizona 85615.

Sincerely,

Dale Thompson

Dale Thompson
Superintendent

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

September 16, 2003

Dale Thompson, Superintendent
Coronado National Memorial
4101 East Montezuma Canyon Road
Hereford, AZ 85615

Subject: Coronado National Memorial Draft General Management Plan/Environmental Impact Statement (Draft EIS), Arizona [CEQ #030368]

Rating: LO – Lack of Objections

Dear Superintendent Thompson:

The U.S. Environmental Protection Agency (EPA) has reviewed the above referenced document. Our review and comments are provided pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality's NEPA Implementation Regulations at 40 CFR 1500-1508, and Section 309 of the Clean Air Act.

The Draft EIS evaluates five alternatives for management of Coronado National Memorial over the next 15 to 20 years. The preferred alternative is also the environmentally preferable alternative. Based on our review, we have rated this Draft EIS as LO -- Lack of Objections (see enclosed "Summary of Rating Definitions").

We appreciate the opportunity to review this Draft EIS and request a copy of the Final EIS when it is filed with our Washington, D.C. office. If you have any questions, please call me at (415) 972-3854, or have your staff call Jeanne Geselbracht at (415) 972-3853.

Sincerely,

Lisa B. Hanf, Manager
Federal Activities Office

004215

Enclosure: "Summary of Rating Definitions"

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COCHISE COUNTY PLANNING DEPARTMENT
1415 Melody Lane, Bisbee, Arizona 85603
(520) 432-9240
Fax 432-9278
James E. Vlahovich, Director

August 11, 2003

Mr. Dale Thompson, Superintendent
National Park Service
Coronado National Memorial
4101 E. Montezuma Canyon Rd.
Hereford, Arizona 85615

Subject: Draft General Management Plan

Dear Superintendent Thompson:

Thank you for the opportunity to review the Draft General Management Plan and EIS for the Coronado National Memorial. It is evident that a considerable amount of time and effort was put into developing and evaluating the range of alternatives presented in this draft.

The Planning Department commends the Service for recognizing and considering the lands adjacent to the Memorial as appropriate for low-density development as designated in the *Southern San Pedro Valley Area Plan* (page 28 of the Draft GMP). This plan was developed by local community members, including the National Park Service, and was adopted in 2001 by the County Board of Supervisors.

The Service's preferred Alternative B, Enhance Opportunities While Protecting Resources, appears to be consistent with the *Southern San Pedro Valley Area Plan* and the current character of the area. The alternative, with its increased emphasis on education/interpretation and resource protection, would not seem to dramatically increase traffic to the memorial, nor result in increased commercial activity outside of the memorial's boundaries, as your assessment states on pages 27 and 28. However, if any of the alternatives did result in a significant increase in visitation, the *Southern San Pedro Valley Area Plan* has designated areas no more than 7 miles from the memorial's boundaries appropriate for commercial development that may accommodate the need for visitor services.

Thank you again for the opportunity to comment on this draft.

Sincerely,

Mark B. Apel
Senior Planner

Xc: James E. Vlahovich, Director
Central Files

NATIONAL PUBLIC LANDS GRAZING CAMPAIGN

Economic Facts of Public Lands Grazing

Public lands grazers are a minority of livestock producers in the West and throughout the country...[1]

- Number of livestock producers with federal grazing permits: **27,000.**[2]
- Percentage of livestock producers with federal grazing permits in the United States: **3%.**[3]
- Percentage of livestock producers with federal grazing permits in eleven Western states: **22%.**[4]
- Number of livestock producers without federal grazing permits: **880,000.**[5]

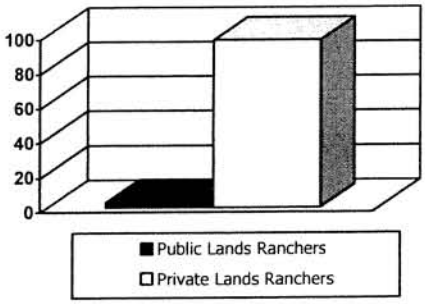
Subsidized by taxpayers, public lands grazers pay far less than market value for federal forage and grazing fees on comparable state and private lands...

- Fee to graze one cow and calf for *one month* (AUM) on federal public lands (2003): **$1.35.**[6]
- Average fee per AUM on state lands in the West (excluding Texas) (1998): **$12.30.**[7]
- Average fee per AUM on private lands in eleven Western states (1999): **$11.10.**[8]

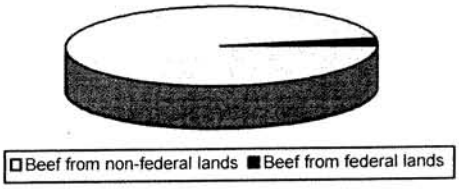
The forage provided, and the beef produced from federal public lands is insignificant...

- Percentage of total feed for livestock (cattle and sheep) in the United States supplied from federal lands: **2%.**[9]
- Percentage of American beef produced from federal rangelands: **less than 3%.**[10]

Private vs Public Lands Ranchers



U.S. Beef Production



National Public Lands Grazing Campaign (www.permitbuyout.net • www.publiclandsranching.org) Ver. 9/12/03

Federal grazing programs contribute very little to Western states' economies...

Aggregate Federal Grazing Statistics for Eleven Western States[11]	
Federal grazing-dependent jobs	17,989
Federal grazing-dependent jobs as percentage of total employment	0.06
Income from federal grazing-dependent jobs as percentage of total job income	0.04
Days of normal job growth to replace all federal grazing-dependent jobs	11
Days of normal income growth to replace all federal grazing-dependent jobs	6

- In Nevada (the state with more federal land than any other outside of Alaska), federal public lands grazing provides 1,228 jobs.[12] By comparison, one casino in Las Vegas employs 37,000 people.[13]

- Alternative uses of federal public lands contribute much more income to local and regional economies than livestock grazing. In the Central Winter Ecosystem Management Area in the Kaibab Plateau, Arizona, dispersed recreation is worth $200,000 annually to the local and regional economies; fuelwood is worth $48,984; livestock grazing is worth $45,988; and deer and turkey hunting is worth $1,324,259.[14]

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[1] The vast majority of "livestock producers" on public lands are beef growers.
[2] Grazing permits for BLM and Forest Service allotments; includes sheep growers; accounts for permittees who operate on both BLM and Forest Service allotments. USDI-BLM, USDA-Forest Service. 1995. Rangeland Reform '94 Final Environmental Impact Statement. USDI-BLM. Washington, DC: 3; *see also* Rogers, P. 1999. Cash cows. San Jose Mercury News (Nov. 7, 1999): 2S (reporting 26,300 permittees on BLM and Forest Service allotments).
[3] USDI-BLM, USDA-Forest Service. 1995. Rangeland Reform '94 Final Environmental Impact Statement. USDI-BLM. Washington, DC: 26.
[4] USDI-BLM, USDA-Forest Service. 1995. Rangeland Reform '94 Final Environmental Impact Statement. USDI-BLM. Washington, DC: 26.
[5] *See* USDI-BLM, USDA-Forest Service. 1995. Rangeland Reform '94 Final Environmental Impact Statement. USDI-BLM. Washington, DC: 26.
[6] USDI-BLM. 2003. Press release: 2003 Federal Grazing Fee Announced. BLM. Washington, DC. (Feb. 6, 2003).
[7] USDA-National Agricultural Statistics Service. 1998. Agricultural graphics—17 state grazing fees adjusted AUM. USDA-NASS. Washington, DC. Available at http://www.usda.gov/nass/aggraphics/graphics.htm.
[8] Rogers, P. 1999. Cash cows. San Jose Mercury News (Nov. 7, 1999): 2S.
[9] USDI-BLM. 1992. Grazing fee review and evaluation: update of the 1986 final report. USDI-BLM. Washington, DC: 2.
[10] Rogers, P. 1999. Cash cows. San Jose Mercury News (Nov. 7, 1999): 1S; Jacobs, L. 1992. THE WASTE OF THE WEST: PUBLIC LANDS RANCHING. Lynn Jacobs, P.O. Box 5784, Tucson, AZ: 354.
[11] T. Power. 1996. LOST LANDSCAPES AND FAILED ECONOMIES: THE SEARCH FOR A VALUE OF PLACE. Island Press. Washington, DC: 184-185 (table 8-2).
[12] T. Power. 1996. LOST LANDSCAPES AND FAILED ECONOMIES: THE SEARCH FOR A VALUE OF PLACE. Island Press. Washington, DC: 184 (table 8-2).
[13] Greenhouse, S. 2001. Behind Las Vegas's glitter, heavy losses and layoffs. New York Times (Oct. 19, 2001).
[14] Souder, J. 1997. How does livestock grazing fit into the larger societal uses of wildlands? *in* PROC. SYMP. ON ENVIRONMENTAL, ECONOMIC, AND LEGAL ISSUES RELATED TO RANGELAND WATER DEVELOPMENTS. Arizona St. Univ. Tempe, AZ: 305.

NATIONAL PUBLIC LANDS GRAZING CAMPAIGN

Livestock Versus Wildlife

Grazing Competition with Wildlife

Forage Allocation

- In one study, scientists found that domestic livestock grazing consumed 88.8 percent of the available forage (cattle and [domesticated] horses 82.3 percent, free-roaming horses 5.8 percent, sheep 0.7 percent), leaving 11.2 percent to wildlife species (mule deer 10.1 percent, pronghorn 0.9 percent, bighorn sheep 0.1 percent, elk 0.1 percent).[1]

Forage Use

- It is a simple concept: forage (grass, forbs [wildflowers], shrubs) consumed by domestic livestock is not available as food and cover for native wildlife—species that are important to healthy ecosystems, admired by wildlife enthusiasts, and prized by hunters Range managers use the rather imprecise animal unit month or AUM to measure and allocate forage. An AUM is the amount of forage necessary to sustain a cow and calf for one month (approximately 650 pounds, although some estimates are more, between 800-1000 pounds[2]). Below are generally accepted AUM equivalents.

Native Wildlife	Animals Per AUM [3]	Domestic Livestock	Animals Per AUM [4]
Bighorn Sheep	6.9	Cow	1
Pronghorn	10.8	Bull	1.25
Mule Deer	7.8	Horse	1.25
Elk	2.1	Goat	5
Bison	0.8	Sheep	5
Moose	1.2		

- The threatened desert tortoise eats less vegetation in one year than a cow eats in one day.[5]
- Percentage of prairie dog towns eliminated for ranching in the 20th century: **98 percent.**[6]
- Number of species, including ferrets, hawks, owls, mice and snakes, dependent on prairie dogs and their burrows: **170.**[7]

Predator Control to Protect Livestock

Predators Killed by USDA Wildlife Services FY1999 [8]	
Animal	**Number**
Coyote	85,938
Fox	6,182
Bobcat	2,435
Badger	601
Black bear	359
Mountain lion	347
Total	**95,862**

Percent of cattle and calf losses attributed to predation (1995): **2.7 percent.**[9]

Percent of cattle and calf losses attributed to digestive problems, respiratory difficulties, calving complications, weather and other causes (1995): **97.3 percent.**[10]

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[1] *Cited in* R. R. Kindschy, C. Sundstrom, and J. D. Yoakum, 1982, Wildlife habitats in managed rangelands—the Great Basin of southeastern Oregon: pronghorns, Gen. Tech. Rep. PNW 145, USDA-Forest Service; USDI-BLM, Portland, OR: 6.
[2] GAO. 1988. Public rangelands: some riparian areas restored but widespread improvement will be slow. RCED-88-105. General Accounting Office. Washington, DC: 12.
[3] Willers, B. 2002. Where bison once roamed: the impacts of cattle and sheep on native herbivore. Pages 241-244 *in* G. Wuerthner and M. Matteson (eds.). WELFARE RANCHING: THE SUBSIDIZED DESTRUCTION OF THE AMERICAN WEST. Foundation for Deep Ecology/Island Press. Covelo, CA. (p. 243, *citing* U.S. Dept. Agric., 1976, National Range Handbook; and Wyoming Game and Fish Dept., 1998, internal data); and other sources.
[4] Willers, B. 2002. Where bison once roamed: the impacts of cattle and sheep on native herbivore. Pages 241-244 *in* G. Wuerthner and M. Matteson (eds.). WELFARE RANCHING: THE SUBSIDIZED DESTRUCTION OF THE AMERICAN WEST. Foundation for Deep Ecology/Island Press. Covelo, CA. (p. 243, *citing* U.S. Dept. Agric., 1976, National Range Handbook; and Wyoming Game and Fish Dept., 1998, internal data); and other sources.
[5] Forest Guardians. undated. Grazing to extinction (factsheet). Forst Guardians. Sante Fe, NM.
[6] Baskin, Y. 1997. THE WORK OF NATURE: HOW THE DIVERSITY OF LIFE SUSTAINS US. Island Press. Washington, DC: 165.
[7] Miller, B., G. Ceballos, R. Reading. 1994. The prairie dog and biotic diversity. Cons. Biol. 8(3): 678 (citing R. Reading, 1993, Toward an endangered species reintroduction paradigm: a case study of the black-footed ferret. Ph.D. Diss., Yale Univ., New Haven, CT).
[8] Predators killed in 17 western states. Predator Conservation Alliance. 2001. Wildlife "Services?" A presentation and analysis of the USDA Wildlife Services Program's expenditures and kill figures for fiscal year 1999. Predator Conservation Alliance. Bozeman, MT: 7.
[9] USDA-NASS. 1996. 1995 cattle and calf losses valued at $1.8 billion. USDA-National Agricultural Statistics Service, Agricultural Statistics Board. (released May 17, 1996). Available at http://usda.mannlib.cornell.edu/reports/nassr/livestock/pct-bbpl/. More livestock are killed by domesticated dogs than mountain lions, bobcats, bears, and wolves, *combined*.
[10] USDA-NASS. 1996. 1995 cattle and calf losses valued at $1.8 billion. USDA-National Agricultural Statistics Service, Agricultural Statistics Board. (released May 17, 1996). Available at http://usda.mannlib.cornell.edu/reports/nassr/livestock/pct-bbpl/.

NATIONAL PUBLIC LANDS GRAZING CAMPAIGN

Livestock and Water

Livestock grazing has damaged 80 percent of the streams and riparian ecosystems in the arid West.[1]

> **"Extensive field observations in the late 1980s suggest riparian areas throughout much of the West were in the worst condition in history."** [2]

Although they represent only 0.5 to 1 percent of the surface area of federally owned Western arid lands,[3] riparian zones are critically important to over 75 percent of terrestrial species in southeastern Oregon and southeastern Wyoming, and 80 percent of wildlife in the Arizona and New Mexico.[4]

> **"Improvident grazing...has been the most potent desertification force, in terms of total acreage [affecting 225 million acres[5] or 351,562 square miles], within the United States."** [6]

Nearly all surface waters in the West are fouled with livestock wastes that produce harmful waterborne bacteria and protozoa such as Giardia.[7]

Belsky, et al. reviewed grazing impacts on water quality and quantity...[8]

- **Water quality:** livestock deposit pathogenic bacteria into streams and increase nutrient content, water turbidity, and water temperatures, all of which harm cold water fish and other species.
- **Stream channel morphology:** grazing results in streambank downcutting that shrinks the channel, and reduces streambank stability and the number and quality of deep pools and stream meanders.
- **Hydrology (stream flow patterns):** grazing causes increased runoff, flood water velocity, number of flood events, and peak flow, while reducing (or *stopping*) summer flow and lowering the water table.
- **Riparian soils:** grazing exposes bare ground, compacts soil and causes erosion, while reducing water infiltration and soil fertility.
- **Streambank vegetation:** grazing reduces the cover, biomass, and productivity of herbaceous and woody vegetation, and impedes plant succession.
- **Instream vegetation:** grazing increases algal populations while causing declines in other, beneficial water plants.
- **Aquatic and riparian wildlife:** grazing reduces the diversity, abundance, and productivity of cold water fish, amphibians, reptiles and invertebrates and alters the composition and diversity of birds and mammals.

[1] Belsky, A. J., A. Matzke, S. Uselman. 1999. Survey of livestock influences on stream and riparian ecosystems in the western United States. J. Soil & Water Conserv. 54(1): 419 (citations omitted).
[2] Chaney, E., W. Elmore, W. S. Platts. 1993. Livestock grazing on western riparian areas. Northwest Resource Information Center. Eagle, ID: 5 (fourth printing; published by the Environmental Protection Agency).
[3] U.S. Government Accounting Office. 1988. Public rangelands: some riparian areas restored by widespread improvement will be slow. RCED-88-105. Government Accounting Office. Washington, DC; Ohmart, R. D. 1996. Historical and present impacts of livestock grazing on fish and wildlife resources in western riparian habitats. Pages 245-279 in P. R. Krausman (ed.). RANGELAND WILDLIFE. Society for Range Management. Denver, CO.
[4] Chaney, E., W. Elmore, W. S. Platts. 1993. Livestock grazing on western riparian areas. Northwest Resource Information Center. Eagle, ID: 2 (fourth printing; produced for the Environmental Protection Agency).
[5] Chaney, E., W. Elmore, W. S. Platts. 1993. Livestock grazing on western riparian areas. Northwest Resource Information Center. Eagle, ID: 5 (fourth printing; produced for the Environmental Protection Agency).
[6] Council on Environmental Quality. 1980. The global 2000 report to the president of the United States: entering the twenty-first century. Pergamon Press. New York, NY.
[7] Suk, T., J. L. Riggs, B. C. Nelson. 1986. Water contamination with giardia in backcountry areas in Proc. of the National Wilderness Conference. Gen. Tech. Rep. INT-212. USDA-Forest Service, Intermountain Res. Stn. Ogden, UT: 237-239.
[8] Adapted from A. J. Belsky, A. Matzke, S. Uselman. 1999. Survey of livestock influences on stream and riparian ecosystems in the western United States. J. Soil & Water Conserv. 54(1): 419-431.

Roads Open Up Paths for Weed Invasions

DAVIS, California, April 18, 2003 (ENS) - Two new studies find that roads have a considerable impact on the spread of invasive species. The studies, conducted by researchers at the University of California at Davis (UC Davis), find that improved roads in wilderness areas spread more invasive weeds than primitive roads and that roadless areas act as refuges for native species against invasions.

Invasive weeds such as cheatgrass and knapweeds have settled on some 125 million acres of the American West - the studies document that roads promote invasion because vehicles can transport non-native seeds into uninfested areas, and disturbed roadsides give weed seeds a place to grow.

"These papers are timely in light of the debate concerning protection for roadless habitats in U.S. national forests," said Jonathan Gelbard, a UC Davis doctoral candidate and coauthor of both studies. "Our findings show that roadless habitats have multiple benefits, not just for the environment, but also for the economy and our quality of life."

"They are not only refuges for native biodiversity," Gelbard explained, "but also protect against non native weed invasions, which are costly for ranchers and public agencies."

One of the UC Davis studies, published in the April issue of "Conservation Biology," is an examination of 42 roads in and around Utah's Canyonlands National Park. Gelbard and research ecologist Jayne Belnap of the U.S. Geological Survey found that each step of road improvement converted an increasing area of natural habitat to roadside habitat, from which non-native weeds spread into adjacent natural ecosystems.

The second study, published by Gelbard and UC Davis professor of environmental science and policy Susan Harrison in the April issue of the journal Ecological Applications, explores the effects of roads on inland California foothill grasslands.

It found that that in areas with typical grassland soils, non-native plants were less abundant and native plants more abundant at sites about a half-mile from roads compared to sites less than 33 feet from roads.

This is a Comment File Created on 08/11/2003
This Comment was Created on 08/20/2003

Name: Curt Bradley
Address: PO box 710
City: Tucson
State: AZ
Zip: 85702
Telephone: 520 623 5252
Email: cbradley@biologicaldiversity.org
Comments: Re: Draft Environmental Impact Statement/General Management Plan for Coronado National Memorial I support Alternatives B and C that include the removal of livestock grazing from the memorial. I have hiked in this area and believe that livestock grazing is incompatible with the recreational opportunities afforded by it. Livestock grazing removes vegetation that is important for wildlife and thus diminishes wildlife viewing opportunities. Because this area is an important wildlife corridor, I strongly believe that livestock grazing should be ended on the monument.

This Comment was Created on 08/22/2003

Name: Martin Taylor
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City: Tucson
State: AZ
Zip: 85702
Telephone:
Email: mtaylor@biologicaldiversity.org
Comments: On behalf of the Center for Biological Diversity and our 7,500+ members in the western US, I am submitting the following comments regarding the Coronado N.M. general management plan draft EIS. The Center agrees that the grazing of livestock on the memorial is inconsistent with the development of the monument for recreational purposes as originally forseen in the enabling Act. The Center therefore supports B or C to the extent that impacts to natural and cultural resources of recreational developments are truly minimized. The Center agrees that restoring the memorials grasslands to the condition seen by Coronado on his expedition is an central purpose of the memorial. This can only be achieved by ending livestock grazing. There were no livestock when Coronado passed through and early reports suggest that southern Arizona grasslands were lush and diverse before the destructive impact of livestock degraded them to the present poor condition. Livestock conflict with the recreational mission. Our members report having their recreational experience on the memorial impaired by the presence of livestock, their manure, bare soil and flies, livestock activities and developments such as ubiquitous fencing, corrals, stocktanks and "developed" springs. None of this is compatible with the mission of restoring the area to its condition at the time of the Coronado Expedition. Coronado undoubtedly also saw an abundance of wild game. Restoring wild game to pristine levels should likewise be considered part of the memorial's mission. Any recreational development should be done so as minimize the disruptive presence of human visitors. Interpretive developments are of great value in this respect to make sure that the public is educated as to the need for strict regulation to protect memorial values. There should be no off-road vehicle use permitted in the monument, not even on roads. These vehicles are noisy and polluting. They are destructive and unnecessary for enjoyment of the Memorial's values. They frighten wildlife and disturb other visitors. Vehicle access should be kept highly restricted to the single main road and parking lots, to ensure that visitation is minimally disruptive to the historic aura, peace and grandeur of this distinctive place. Sincerely Martin Taylor, Ph.D. Conservation Biologist Se habla español Center for Biological Diversity Centro de Diversidad Biologica www.biologicaldiversity.org Tucson AZ (main office) PO Box 710, Tucson AZ 85702, USA Buxton NC ~ Berkeley CA~ Idyllwild CA ~ Phoenix AZ Portland OR ~ San Diego CA ~ Sitka

AK ~ Silver City NM Protecting endangered species and wild places through science, policy, education, and environmental law Protegiendo especies en peligro y lugares naturales por sciencia, política, educación y derecho ambiental. Email:- mtaylor@biologicaldiversity.org Tel:- (520) 623 5252 ext 307 Fax:- (520) 623 9797

This Comment was Created on 08/25/2003

Name: tim lengerich
Address: POB 111
City: ajo
State: az
Zip: 85321
Telephone:
Email: timlengerich@hotmail.com
Comments: Please choose Plan B for the Monument plan. No cows!! There is a god, at last.

This Comment was Created on 10/03/2003

Name: Alexander "Sandy" Kunzer
Address: 4969 S. Laredo Pass
City: Sierra Vista
State: AZ
Zip: 85650
Telephone: (520) 803-8490
Email: sbkunzer@theriver.com
Comments: Ladies and Gentlemen, I have reviewed the Draft General Managent Plan/Environmental Impact Statement, worked as a volunteer in the Memorial for over 2 years, entered all of the public access areas in the Memorial and based on these activities, fully support the implementation of Alternative B (Prefered Alternative) for future management of the Memorial. This support is given even though I have I have reservations about the EIS, finding it incomplete and incorrect in places even with the tremendous and conciencious effort that is obvious in its preparation. Thank you for this opportunity to comment. Alexander "Sandy" Kunzer

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This Comment was Created on 10/06/2003

Name: Steve Saway
Address: 533 Suffolk Drive
City: Sierra Vista
State: AZ
Zip: 85635
Telephone: 520-459-8959
Email: stevesaway@excite.com
Comments: Dear sir: I concur with selection of alternative B for the General Management Plan for Coronado National Memorial. I believe it best strikes a balance between protection of the Memorial's resources while enhancing visitor educational and recreational opportunities. I am glad to see the development of additional hiking trails and believe this will help the Memorial support the growing number of visitors who desire to experience the Memorial in its natural environment. I would like to recommend one additional area for

consideration. The Memorial currently has no area designated for dispersed overnight camping. However, due to the fact that the southern entry point for the Arizona Trail begins in the Memorial, it would be desirable for long distance hikers to have an area to camp before beginning their journey. Even if this could only be done with a permit based process, it would fill a definite need. Thank you for the opportunity to submit these comments. Steve Saway 533 Suffolk Drive Sierra Vista, AZ 85635

August 28, 2003

1922 E. Orion Street
Tempe, AZ 85283

Mr. Dale Thompson, Superintendent
Coronado National Memorial
4101 E. Montezuma Canyon Road
Hereford, AZ 85615

Dear Mr. Thompson,

I am writing to submit comments on your draft environmental impact statement/general management plan (EIS/GMP).

I support the implementation of your preferred alternative, Alternative B, primary because it would end livestock grazing on the Memorial. While your recently completed Livestock Management Plan will ensure that cattle grazing is better managed, if it continues, the Memorial's natural resources will recover more quickly without any grazing at all. Furthermore, even the best livestock management plan cannot completely eliminate the negative ecological impacts of grazing in an arid place like the Memorial. Since livestock are currently permitted to graze on adjacent Forest Service lands, the termination of grazing on the Memorial could also serve to show a comparison between the two types of land management.

One more thing. When Coronado traveled through this area in the 1540's, there was no livestock grazing, other than the animals he was dragging along with him.

Thank you for this opportunity to participate.

Jeff Burgess
Ph 602-417-4486 (day)

Superintendent
Coronado National Memorial
4101 East Montezuma Canyon Road
Hereford, AZ 85615

Re: L7615

Dear Superintendent Thompson.

The draft Environmental Impact Statement/General Management Plan for Coronado National Memorial has been received.

I went into shock and had two sleepness nights after I noticed that you spent $ 6.05 to mail it to me and probably to hundreds of others also. I wish I had that kind of money to take my bad left knee to the doctor. Please take me off your mailing list for anything that costs more than 37 cents.

I like that under your preferred alternative B live stock grazing will be discontinued in the memorial. Please do not change your mind on this nor give in to the pressure from the pro live stock grazing lobby!

I would like to see recycling bins and actual recycling, particularly of glass and plastic bottles when the visitor center will be rehabilitated and new pullouts and waysides provided with garbage cans.

Sincerely

Dieter Kamm

Dieter Kamm
4393 Plaza Oro Loma
Sierra Vista, Arizona 85635
August 4, 2003

Please address your comments to Superintendent, Coronado National Memorial, 4101 East Montezuma Canyon Road, Hereford, AZ 85615, or Telephone: (520) 366-5515. The document will be available on the Internet in the NPS planning website at: http://planning.nps.gov/plans.cfm. Comments may be sent to the website that will include an automated public response form. Finally you may hand-deliver your comments to park headquarters, 4101 East Montezuma Road, Hereford, AZ.

For information or questions concerning the GMP, call the Superintendents Office at the telephone number listed above.

We thank you in advance for your attention and we appreciate your concern for the future of Coronado National Memorial.

Sincerely,

Dale Thompson

DaleThompson
Superintendent

I am voting for alternative C. I believe the priority should definitely be on conserving natural and cultural resources. There is always time to make other changes in the future if necessary; if making as little change as possible now. Whereas, making lots of the changes suggested in the other alternatives would mean there would be no 'going back'.

I would like to suggest that saving paper by printing 'back to back' would be an excellent idea in saving resources as well.

Thank you for considering all the input you are asking ~~for~~ of the community.

Sincerely,
Alice Moffitt

Warren K. North and Barbara L. North
516 Raymond Drive
Sierra Vista, AZ 85635

August 6, 2003

Superintendent
Coronado National Memorial
4101 East Montezuma Canyon Road
Hereford, AZ 85615

Reference: L7615

Attention: Dale Thompson, Superintendent,

Thank you for asking us to comment on the draft Environmental Impact Statement/General Management Plan for Coronado National Memorial.

We believe grazing in the memorial should be ended.

Alternative B would be our choice.

Our experiences include some exciting events in remote places on government lands. We believe you might want to take account of responsible estimates of increases in cross border traffic in coming years. Building new facilities in very remote locations might place isolated personnel at risk.

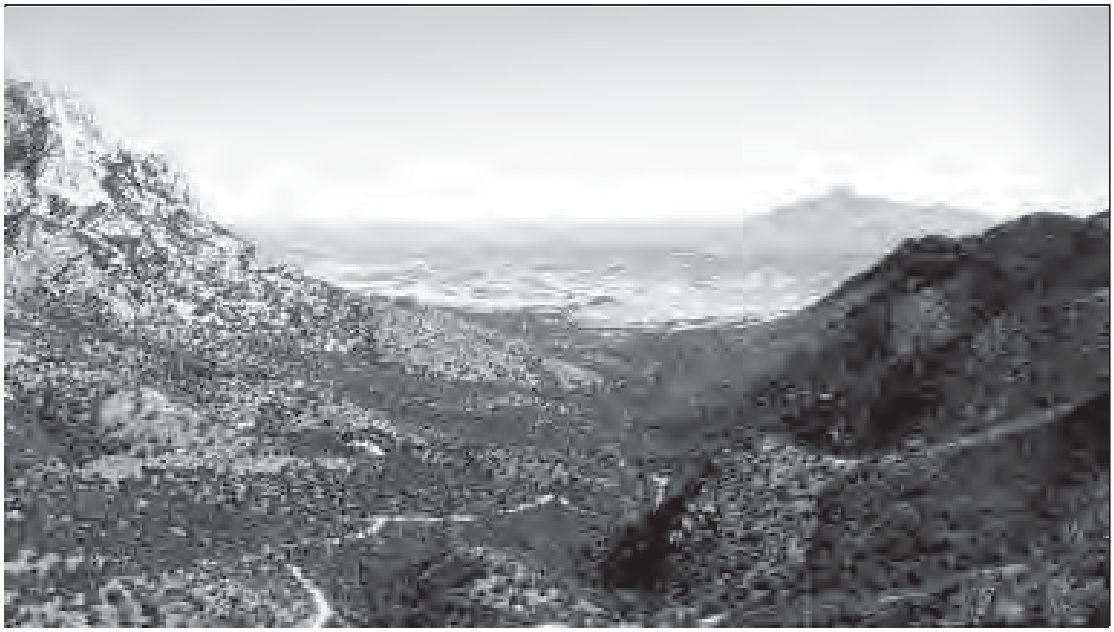
We wish you well in your reconstruction efforts,

Very truly yours,

Warren North Barbara North

Warren and Barbara North

APPENDIXES/REFERENCES/ PREPARERS/INDEX



APPENDIX A: LEGISLATION

An Act To provide for the establishment of the Coronado International Memorial, in the State of Arizona, approved August 18, 1941 (55 Stat. 630)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That for the purpose of permanently commemorating the explorations of Francisco Vásquez de Coronado, the President of the United States is authorized to declare, by proclamation, any lands within the following-described area, subject to all valid existing rights, to be established as the "Coronado International Memorial":

Coronado International Memorial, Establishment.

Description of area.

Gila and Salt River meridian: Township 24 south, range 20 east, section 10, south half southwest quarter, south half southeast quarter; section 11, south half southwest quarter; section 13, southwest quarter northwest quarter, south half; section 14, northwest quarter, south half, northwest quarter northeast quarter, south half northeast quarter; section 15, all; section 22, all; section 23, all; section 24, all; township 24 south, range 21 east, section 17, south half southwest quarter; section 18, southwest quarter, south half southeast quarter; section 19, all; section 20, lots 3 and 4; aggregating approximately two thousand eight hundred and eighty acres: *Provided,* That said proclamation shall not be issued until the President of the United States shall have been advised through official channels that the Government of Mexico has established, or provided for the establishment of, an area of similar type and size adjoining the area described herein. (16 U.S.C. sec. 450y.)

Proviso.

Establishment of adjoining area by Mexico.

Regulation, etc., by National Park Service.

SEC. 2. The National Park Service, under the direction of the Secretary of the Interior, shall promote and regulate the use of the Coronado International Memorial for the benefit and enjoyment of the people of the United States. Insofar as applicable and not in conflict with this Act, the Act of August 25, 1916 (39 Stat. 535), providing for the establishment of a National Park Service, as amended and supplemented, shall govern the promotion and regulation of the designated memorial area: *Provided,* That nothing in this Act shall be construed to authorize any recreational or other development by the National Park Service within the sixty-foot strip north of the international boundary between the United States and Mexico withdrawn by proclamation of the President dated May 27, 1907 (35 Stat., part II, p. 2136), unless such development has received the prior approval of the Secretary of State. (16 U.S.C. sec. 450y-1.)

16 U.S.C. secs. 1-4.

Proviso.

Development within strip north of international boundary.

SEC. 3. The Secretary of the Interior, under such regulations as shall be prescribed by him, which regulations shall be substantially similar to those now in effect, shall permit—

(a) Grazing of livestock within the memorial area to the extent now permitted within the said area when such grazing will not interfere with recreational development authorized by this Act; and

Grazing, mining, etc., within memorial area.

(b) Prospecting and mining within the memorial area, when not inconsistent with the public uses thereof. Rights to minerals in the area shall not extend to the lands containing such minerals, but the Secretary of the Interior shall grant rights to use so much of the surface of the lands as may be required for all purposes reasonably incident to the mining and removal of the minerals. (16 U.S.C. sec. 450y-2.)

SEC. 4. In the administration of the memorial area the Secretary shall not permit the construction of fences except (a) along the international boundary, (b) beside memorial roads or approach roads, and (c) around memorial areas within which improvements have been located by the National Park Service: *Provided,* That any roads constructed within the memorial area by the National Park Service shall include necessary cattle underpasses properly located for the passage of cattle across such roads: *And provided further,* That the right to the exclusive beneficial consumptive use for stock-watering purposes of any water heretofore developed or used for such purposes within the memorial area shall remain in the present holders thereof, their heirs, assigns, successors, and administrators, so long as such water continues to be used exclusively for such purposes: *And provided further,* That nothing in this Act shall be construed to alter or affect any water right in the State of Arizona or the jurisdiction of said State over its waters: *And provided further,* That neither roads nor public campgrounds shall be constructed by the National Park Service within the south half southwest quarter of said section 10. (16 U.S.C. sec. 450y-3.)

Construction of fences, roads, etc.

Provisos.

Cattle underpasses.

Stock-watering rights.

Water rights, Arizona.

Restriction.

SEC. 5. Upon submission of title satisfactory to him, the Secretary of the Interior, on behalf of the United States, may accept lands and interests in lands which are within the memorial area but are not in Federal ownership and which are offered to the United States without cost. (16 U.S.C. sec. 450y-4.)

Acceptance of non-Federal lands, etc.

2. Coronado National Memorial

		Page
Amendment to Act of August 18, 1941, establishing the Coronado International Memorial, substituting the words "Coronado National Memorial" for "Coronado International Memorial"	Act of July 9, 1952	370
Revision of boundaries of memorial and repair and maintenance of access road thereto authorized	Act of September 2, 1960	370

An Act To amend the Act entitled "An Act to provide for the establishment of the Coronado International Memorial, in the State of Arizona," approved August 18, 1941 (55 Stat. 630), approved July 9, 1952 (66 Stat. 510)

Coronado National Memorial, Ariz. 16 U.S.C. §§ 450y—450y–4.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the words "Coronado National Memorial" are hereby substituted in lieu of the words "Coronado International Memorial" wherever such words occur in the Act of August 18, 1941 (55 Stat. 630).

SEC. 2. That section 1 of the aforesaid Act is hereby amended by striking out ": *Provided*, That said proclamation shall not be issued until the President of the United States shall have been advised through official channels that the Government of Mexico has established, or provided for the establishment of, an area of similar type and size adjoining the area described herein". (16 U.S.C. § 450y note. See, *Laws Relating to the National Park Service*, Supp. I, (1944) p. 142–143.)

An Act To revise the boundaries of the Coronado National Memorial and to authorize the repair and maintenance of an access road thereto, in the State of Arizona, and for other purposes, approved September 2, 1960 (74 Stat. 736)

Coronado National Memorial, Ariz. Revised boundaries. 16 U.S.C. 450y.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That, in furtherance of the purposes of the Act of August 18, 1941 (55 Stat. 630), as amended, and to facilitate the administration and development of the Coronado National Memorial, Arizona, the boundaries thereof are hereby revised by the following additions and deletions of land:

(1) Inclusion in the memorial and exclusion from the Coronado National Forest of lots 2 and 7 and a portion of Homestead Entry Survey 310 situated in section 18, township 24 south, range 21 east, Gila and Salt River base and meridian, said portion of Homestead Entry Survey 310 being more particularly described as follows: Beginning at the southwest corner (identified as corner number 1), of Homestead Entry Survey 310, said point being located on the present boundary of Coronado National Memorial and marked by an iron pipe with a brass cap and a rock cairn placed by the United States Bureau of Land Management in 1955; thence north zero degrees

thirty-three minutes west, one thousand two hundred ninety-four and twenty-six hundredths feet, more or less, along the west boundary of said tract, which line is also the present boundary of said memorial, to the northeast corner of lot 8, section 18, said point being marked by an iron pipe with a brass cap and a rock cairn placed by the United States Bureau of Land Management in 1955; thence north zero degrees twenty-three minutes east, two hundred thirty and eight-tenths feet, more or less, along the west boundary of Homestead Entry Survey 310 to a point on a circular curve marked by an iron pipe with a National Park Service brass cap, said point being located south eighty-one degrees forty-four minutes east, exactly one hundred forty feet from the point of curvature of said curve; thence southeasterly five hundred forty-eight and two-tenths feet along said circular curve to the right of radius one thousand seven hundred thirty-two and four-tenths feet and having a beginning tangent bearing of south eighty-four degrees three minutes east (from point of curvature to point of intersection), to the point of tangency of said curve; thence south sixty-one degrees sixteen minutes east, two hundred twenty-four and eight-tenths feet to the point of curvature of a circular curve to the right; thence southeasterly two hundred ninety-two and six-tenths feet along said circular curve to the right of radius six thousand twenty-nine and six-tenths feet to the point of tangency of said curve; thence south fifty-eight degrees twenty-nine minutes east, five hundred eighty-eight and seven-tenths feet to the point of curvature of a circular curve to the right; thence southeasterly two hundred twenty-five and nine-tenths feet along said circular curve to the right of radius two thousand two hundred nine and nine-tenths feet to the point of tangency of said curve; thence south fifty-two degrees thirty-eight minutes east, twenty-eight and eight-tenths feet to the point of curvature of a circular curve to the left; thence southeasterly two hundred sixteen and nine-tenths feet along said circular curve to the left of radius one thousand six hundred nine and nine-tenths feet to the point of tangency of said curve; thence south sixty degrees twenty-one minutes east, thirty and seven-tenths feet to the point of curvature of a circular curve to the right; thence southeasterly seven hundred thirteen and six-tenths feet, more or less, along said circular curve to the right of radius one thousand two hundred fifty-four and nine-tenths feet to a point on the southern boundary line of Homestead Entry Survey 310 marked by an iron pipe with a National Park Service brass cap, said point also being located on the present northern boundary line of Coronado National Memorial; thence north eighty-nine degrees forty-nine minutes west two thousand three hun-

dred and sixty-one feet, more or less, along the southern boundary line of Homestead Entry Survey 310, which line is also the present northern boundary of the said memorial, to the point of beginning (all bearings referred to the true meridian).

(2) Inclusion in the Memorial and exclusion from the Coronado National Forest of lots 5 and 6 in section 20, township 24 south, range 21 east, Gila and Salt River base and meridian.

(3) Exclusion from the Memorial and inclusion in the Coronado National Forest of the north half southwest quarter northwest quarter section 13, and the north half southeast quarter northeast quarter section 14, all in township 24 south, range 20 east, Gila and Salt River base and meridian. (16 U.S.C. § 450y–5 [Supp. II].)

Land acquisition.

SEC. 2. The Secretary of the Interior is authorized to acquire lands and interests in lands within the revised boundaries of the Coronado National Memorial by purchase, donation, with donated funds, or by such other means as he may consider to be in the public interest. Lands and interests in lands acquired pursuant to this Act shall become a part of the Memorial and be administered by the Secretary of the Interior in accordance with the provisions of the Act of August 25, 1916 (39 Stat. 535), as amended, and pursuant to sections 2, 3, and 4 of the Act of August 18, 1941 (55 Stat. 630), as amended. (16 U.S.C. § 450y–6 [Supp. II].)

16 U.S.C. 1.
16 U.S.C. 450y–1–3.

16 U.S.C. 17j–2.

SEC. 3. The Act approved August 7, 1946 (60 Stat. 885), is hereby amended by substituting a semicolon for the period at the end of subsection (a), section 1, and inserting immediately thereafter the following: "repair and maintenance of the class 'C' road lying between the terminus of F.A. 383 at the east boundary of Coronado National Forest and the point where said class 'C' road enters Coronado National Memorial in the vicinity of Montezuma Pass, approximately 5.3 miles." (16 U.S.C. § 17j–2 [Supp. II].) [1]

Appropriation.

SEC. 4. There is hereby authorized to be appropriated the sum of not to exceed $3,000 for the purpose of acquiring lands, interests in lands, and improvements thereon as may be necessary for carrying out this Act. (16 U.S.C. § 450y–7 [Supp. II].)

[1] See also General Legislation, pp. 16–17.

APPENDIX B: SUMMARY OF KEY LEGAL MANDATES

Legal mandates provide direction for what can and cannot be considered in this plan. Several provisions of key legal mandates are summarized below.

NATIONAL PARKS AND RECREATION ACT OF 1978 (PL 95-625)

Section 604(b) of the National Parks and Recreation Act requires that general management plans be prepared and revised in a timely manner for each unit in the national park system. The act further specifies that general management plans shall include measures for the preservation of the area's resources, indications of the types and intensities of development associated with public use of the unit, visitor carrying capacities for all areas of the unit, and indications of potential modifications of the unit's external boundaries if needed.

ENDANGERED SPECIES ACT OF 1973, AS AMENDED (16 USC 1531 ET SEQ.)

The purpose of the Endangered Species Act is to protect animal and plant species that are currently in danger of extinction (endangered) and those that may become so in the foreseeable future (threatened). Section 7 requires all federal agencies to ensure that their activities do not have adverse impacts on the continued existence of threatened or endangered species or on designated areas (critical habitats) that are important in conserving those species. Thus, the National Park Service is required to fully integrate endangered species conservation planning into park system management. Agencies also are required to consult with the U.S. Fish and Wildlife Service to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitat. The result of formal or informal consultation with the Fish and Wildlife Service should be documented in an environmental assessment or environmental impact statement.

NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (NEPA — PL 91-190)

The National Environmental Policy Act sets forth the federal policy to preserve important historic, cultural, and natural aspects of our national heritage. Another purpose of the act is to help public officials make decisions that are based on an objective understanding of environmental consequences and to take actions that protect, restore, and enhance the environment. The act applies to all federal projects or projects that require federal involvement. All federal agencies are directed to use a systematic interdisciplinary approach that integrates natural and social sciences in planning and decision-making that may affect the human environment. This act and the Council on Environmental Quality implementing regulations describe the process that must be followed by a proposed federal action such as this plan. Among the steps in the process, this act and the regulations require early coordination, called "scoping," to determine the scope and significance of issues to be addressed in an environmental impact statement. A structured format for public involvement during the public review process is specified. When preparing an environmental impact statement, federal agencies are further required to rigorously explore and objectively evaluate all reasonable alternatives to the proposed action.

NATIONAL HISTORIC PRESERVATION ACT OF 1966, AS AMENDED (16 USC 470, ET SEQ.)

The National Historic Preservation Act establishes as federal policy that the historical and cultural foundations of the nation's heritage be preserved. Section 106 of the act requires that federal agencies that have direct or indirect jurisdiction over undertakings take into account the effect of those undertakings on properties eligible for or listed on the National Register of Historic Places. The section also gives the Advisory Council on Historic Preservation and the state historic preservation officer an

opportunity to comment on the undertaking. The 1992 amendments to the act have further defined the roles of American Indian tribes and the affected public in the section 106 consultation process. Section 110 of the act requires that federal managers, in consultation with the state historic preservation officers, establish programs to identify, evaluate, and nominate properties to the National Register of Historic Places. National register eligible or listed properties and national historic landmarks are afforded special protection in federal project planning and implementation. In 1999 the Advisory Council on Historic Preservation issued revised section 106 regulations. The role of early and continuing consultation with the state historic preservation office and American Indian groups is clarified.

Under the terms of stipulation VI. E of the 1995 programmatic agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers, the National Park Service, "in consultation with the SHPO, will make a determination about which undertakings are programmatic exclusions under IV. A and B, and all other undertakings, potential effects on those resources to seek review and comment under 36 CFR 800.4–6 during the plan review process." The implementation of all construction actions in the preferred alternative would require consultation and review at the scoping, conceptual, and design stages by the Arizona state historic preservation office. American Indian groups would participate in these reviews as well.

In the following table the specific undertakings are listed, along with the National Park Service's determination of how those individual undertakings relate to the 1995 programmatic agreement.

TABLE B-1: ACTIONS THAT MAY AFFECT CULTURAL RESOURCES AND ASSOCIATED COMPLIANCE REQUIREMENTS

(Requirements of the Arizona State Historic Preservation Office and/or the Advisory Council on Historic Preservation)

Action	Compliance Requirement
Rehabilitate visitor center	Further SHPO review necessary
Construct visitor center annex	No further SHPO review unless construction would affect National Register of Historic Places archeological sites or unless location would affect a cultural landscape
Develop trails and wayside exhibits	No further SHPO review necessary
Demolish Montezuma Ranch structures	No further SHPO review unless ranch determined eligible for National Register of Historic Places
Upgrade facilities at Montezuma Pass	No further SHPO review necessary
Do rehabilitation work in housing area	Further SHPO review necessary

APPENDIX C: WILDERNESS SUITABILITY ASSESSMENT

DRAFT MEMORANDUM

To: Director

From: Regional Director, IMR

Subject: Wilderness Suitability Assessment - Coronado National Memorial

In keeping with the instructions of the Wilderness Act (P.L. 88-577, 78 Stat. 890; 16 U.S.C. 1131-1136) and National Park Service Management Policies (Chapter 6: Wilderness Preservation and Management), we have completed an in-park wilderness suitability assessment evaluating the memorial, an area of 4,750 acres.

In accordance with law and NPS Management Policies, Coronado National Memorial has reviewed the memorial's land and determined that they are neither roadless nor undeveloped, nor are of sufficient size to make practicable their preservation as wilderness.

The Wilderness Act defines wilderness as "an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation which is protected and managed so as to preserve its natural conditions…"

Our suitability assessment finds that the majority of this memorial's land would not meet the primary definitions of wilderness, as defined in the Wilderness Act. This determination applied the following Wilderness Act and Management Policy criteria: in that it is an area:

- the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain;
- the area is undeveloped and retains its primeval character and influence, without permanent improvements or human habitation;
- the area generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
- the area is protected and managed so as to preserve it natural conditions; and,
- the area offers outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Our assessment did recognize that the area was operated as working cattle ranch and contained pastures for grazing during most of the period of private and public ownership, and the area does contain some physical evidence of this occupation. In addition, the area contains physical evidence from various mining operations in the area and an active partially-paved road that bisects the national memorial. In addition, other active roads are found on the memorial land. The evaluation on these criteria determined that the national memorial lands do not meet the

undeveloped/roadless, size, or wilderness character criteria and are therefore unsuitable for preserving as wilderness.

The memorial lands are fragmented by dirt and paved roads, parking lots, picnic areas, power and phone lines, private and governmental structures, and a utility corridor. There is no plan in the foreseeable future to remove these features.

Significant portions of the national memorial generally appear to be affected by human activity. Although these areas offer some opportunities for solitude and primitive and unconfined recreation, the small size of the areas and proximity of roads make these opportunities limited at best.

The free play of natural forces and processes have been altered by road, utility line construction and maintenance; fire suppression since the late 1880s; 100 years of grazing in grassland areas; mining; vegetation manipulation and invasion of exotic species; changes to diversity, populations levels and structure, and behavior of wildlife; and continued human presence and development.

Attached is a draft *Notice of Final Determination of Non-Suitability* for publication the *Federal Register* should you approve this memorandum as the NPS' final wilderness assessment suitable determination for Coronado National Memorial.

Sincerely,

Draft

Findings

Wilderness Suitability Assessment
Coronado National Memorial

These actions are in accordance with long standing policy and law. The Wilderness Act of 1964, regulations in the Code of Federal Regulations (Title 43 *Public Lands: Interior*, Part 19 *Wilderness Preservation*), Secretarial Order 2920, and NPS Management Policies (2001; *Chapter 6, Wilderness Preservation*) require that the National Park Service review roadless and undeveloped areas, including new areas or expanded boundaries, within the National Park System to determine whether they are suitable or not suitable for preserving as wilderness.

NEPA requirements for this process are met by applying the Categorical Exclusion 3.4 (E)(6) regarding actions related to inventories.

Parcel Description

Coronado National Memorial was formerly a part of Coronado National Forest and working ranches on the United States-Mexico border. It is in southeast Arizona, 21 miles south of Sierra Vista and 26 miles west of Bisbee. It comprises 4.750 acres with two small private in holdings. Currently, two areas of the memorial are leased for grazing. A road through the memorial is paved about a mile beyond the visitor center and then becomes a mountainous dirt-and-gravel road that leads to Montezuma Pass. Other dirt roads transverse the memorial providing access to private in holding, grazing allotments, and are service roads for the park staff. The area contains housing, visitor facilities, and administrative facilities for the park. Presently, structures associated with the Montezuma Ranch can be found in the grassland area of the memorial south of the entrance road. The ranch has been acquired by the National Park Service and either will be adaptively used for park purpose or the structures removed and the area restored to grassland.

Suitability Assessment

According to law, regulation, and policy, a suitability assessment is a factual determination, based on available objective criteria and best professional judgment of park staff, of whether the memorial 1) are undeveloped or roadless, 2) are of sufficient size to make management as wilderness practicable or are more than 5,000 acres and 3) meet criteria of wilderness character. The following information addresses those requirements and criteria.

1) Is the memorial undeveloped or roadless?

According to Department of Interior regulations at 43 CFR 19, the memorial's lands do not fit the definition of "roadless": the memorial is bisected by road which is paved about a mile beyond the visitor center and then becomes a mountainous dirt-and-gravel road that leads to Montezuma Pass. This road is regularly maintained and is drivable in a passenger car without four wheel drive; this road is the primary access to into the memorial. The road to the two private in holdings are maintained and drivable in a passenger car without four wheel drive. East Forest Land and Windmill Road are not regularly maintained, but are drivable with four wheel drive vehicles.

The memorial's land does not qualify as undeveloped: see Wilderness Character criteria below.

2) Is the land more than 5,000 acres or of sufficient size to make practicable preservation and use in an unimpaired condition?

The total acreage for the memorial is 4,750 acres. Development within the memorial has further fragmented park lands. The one area in the national memorial that is protected from road noise is the south slope of Smuggler's Ridge but this is only 670 acres. The small size of this memorial's lands, the general fragmentation by roads and utility corridors and, for the most part, the isolation from designated wilderness.

Specifically, the following would be impediments to the practical management of this area as wilderness:

- While a few of the ecological changes noted under the Wilderness Character criteria (below) could be restored to a more natural condition, most of them would be difficult or impossible to improve due to the small size of the area, incompatible uses on adjacent lands, and the roads and utility corridors.
- The small size of the memorial combined with the numerous developments makes it difficult to ensure that the imprint of human's work would appears to be substantially unnoticeable or that the area would retain its primeval character. Extensive restoration work, with possible loss of cultural resources would be necessary and would still not change the incompatible uses on surrounding lands that also detract from these qualities.
- Because the area's naturalness is compromised by past and current uses, extensive restoration would be required to "preserve natural conditions," which would compromise the wildness of the area.
- The small size of the area and the proximity to roads, development, and adjacent incompatible uses make it difficult to provide for opportunities for solitude or a primitive and unconfined type of recreation.

3) Criteria regarding the nature and quality of Wilderness Character

Criterion 1: The earth and its community of life are untrammeled by humans, where humans are visitors who do not remain.

The free play of natural forces and processes has been altered in the following ways:

- Fire suppression: Fire has been suppressed here since the late 1880s, resulting in significant changes in vegetation, fuel loads, and fire intensity. Land use surround the memorial (timber production, grazing, and private homes) may prevent the application of management tactics that would eventually return a natural fire regime.
- Grazing: Grazing has occurred on memorial lands since the early 1900s and today the memorial contains two grazing allotments. One of which (Joe's Spring) is activity being used though under the guidance of the memorial's livestock management plan and the other (Montezuma) has not been grazed since 1990. Grazing often has some or all of the following effects: reduction of biomass available to wildlife for forage and cover; introduction of invasive alien species; change in species composition; and increased erosion.
- Vegetation manipulation: An orchard was planted in the area of Montezuma Ranch as well as some non-native plants near ranch buildings. The orchard has been removed. Vegetation removal will probably continue along the road and power line corridor as part of routine maintenance. Various invasive alien species, are common in the pasture

area. The majority of grass and grass-like species within the area are invasive non-natives.

- Road construction and maintenance: The construction and maintenance of the road, the ranch infrastructure, mining infrastructure, and visitor and administrative infrastructure have over time increased sedimentation and changed natural drainages, which in turn has affected vegetation and habitat. The road and buildings also increases the chance of alien species introduction and other edge effects.
- Wildlife: Diversity, population levels and structure, behavior, and gene flow of wildlife may have been affected by hunting, predator control, and human presence prior to establishment of the national memorial. The fragmentation of the area by the main memorial road reduces its value to wildlife.
- Visitation: Public visitation and illegal activities occur on memorial lands throughout the year.

Criterion 2. The area is undeveloped and retains its primeval character and influence, without permanent improvements or human habitation.

- Developments and permanent improvements: the main memorial road, East Forest Lane, Windmill Road, power line, underground utilities, dumps, fences, stock tanks, remains of ranch house and associated structures, visitor center, picnic area, maintenance facilities, administrative offices, park housing, parking lots, private homes, and mine sites.
- Primeval character and influence: This is compromised by both the developments and the ecological modifications noted under criterion 1.
- Human habitation: Residence for three park staff (and their families) and two private homes.

There is no plan to remove the main memorial road, active power lines, or phone lines in the foreseeable future, and these corridors would not qualify for wilderness designation. Excluding them would leave segments areas of a few hundred acres.

Criterion 3: The area generally appears to have been affected primarily by the forces of nature, with the imprint of humans' work substantially unnoticeable.

Most of the ecological changes noted under criterion 1 would be noticeable to a trained observer. The development noted under criterion 2 would be noticeable by untrained visitors from all of the area except south of Smuggler's Ridge. Some of the ecological changes, such as the change in fire regime or vegetation, would be noticeable to the untrained observer, although they might not realize the anthropogenic nature of the change.

Criterion 4. The area is protected and managed so as to preserve its natural condition.

The parking lots, picnic area, visitor center area, maintenance area, housing area, maintenance along the main memorial road, power lines, roads and area around the private in holdings would continue to be maintained by manual and mechanical methods. All fires are suppressed in the memorial.

Criterion 5. The area offers outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Visitation to the area is moderate to heavy with many visitors taking a short hike on one of the park trails. The chance of seeing another person during a half day visit to the area is greater than 90%. The paved road bisects the national memorial, and most of the memorial's lands are less than 1 mile from the road, which is visible from most areas within the boundary. Road noise can be heard from most places.

Other Considerations: A wilderness may also contain significant ecological, geological, or other features of scientific, educational, scenic, or historic value.

- Ecological: The memorial contains habitat for the lesser long-nosed bat (endangered), the Mexican long-tongued bat (species of concern), Mexican spotted owl (threatened) and loggerhead shrike (species of concern).
- Geological: There is nothing significant.
- Scientific: There is nothing
- Educational: Dramatic views of land areas in the U.S. and Mexico where the Coronado Expedition may have traveled.
- Scenic: Dramatic views of land areas in the U.S. and Mexico where the Coronado Expedition may have traveled.
- Historical: Historic and pre-historic use of the area occurred and there have been archeological survey of the area. The area has been mined, logged, ranched, homesteaded, traveled through, and hunted over the years.

Public Input

A newsletter issued in June 2001 requesting public thought on the suitability of Coronado National Memorial for wilderness designation. The newsletter was sent to the mailing list of about 400 agencies and individuals as well as some 23 conservation groups. The newsletter was placed on the internet for broader public access. A wide range of opinions was received in the 38 electronic and mailed comments. Some people wrote in favor of all of formal wilderness designation while others opposed any wilderness designation.

A follow-up newsletter was published in February 2001 explaining the National Park Service determination that neither Coronado National Memorial nor a portion of the memorial was not suitable for wilderness designation. The results from the park service's evaluation are being placed in the draft Coronado National Memorial General Management Plan/Environmental Impact Statement.

APPENDIX D: DEVELOPMENT OF PREFERRED ALTERNATIVE

The preferred alternative (alternative B) was developed in 2001 using an evaluation process called "Choosing By Advantages." The planning team used the process to examine an initial set of alternatives (alternatives A–E) and to evaluate the attributes of each against a set of factors to determine the relative advantage of one alternative action over another. The factors were as follows:

- Maximize the preservation and protection of natural and cultural resources.
- Maximize the national memorial's operational efficiency and sustainability.
- Maximize the range of visitor services, educational activities, and interpretive opportunities.

The evaluation resulted in a numerical ranking of the greatest advantages offered by each alternative. Each alternative offered certain strong advantages. Adding the factor of cost led to the selection of a preferred alternative. This process was a preliminary internal exercise and remains subject to change based on public comments and other factors.

APPENDIX E: SCIENTIFIC NAMES OF PLANTS AND ANIMALS DISCUSSED IN THIS PLAN

Common Name	Scientific Name
ANIMALS	
Desert cottontail	*Sylvilagus audubonii*
Acorn woodpeckers	*Melanerpes formicivorus*
Black-tailed jackrabbit	*Lepus californicus*
White-tailed deer	*Odocoileus virginianus*
Mule deer	*Odocoileus hemionus*
American kestrel	*Falco sparverius*
Arizona shrew	*Sorex arizonae*
Bald eagle	*Haliaeetus leucocephalus*
Barking frog	*Eleutherodactylus augusti*
Barred tiger salamander	*Ambystoma mavortium*
Blackneck garter snakes	*Thamnophis cyrtopsis*
Black-tailed prairie dog	*Cynomys ludovicianus*
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*
Chihuahuan blackhead snake	*Tantilla wilcoxi*
Coachwhip	*Masticophis flagellum*
Common king snake	*Lampropeltis getula*
Cooper's hawk	*Accipiter cooperii*
Desert shrew	*Notiosorex crawfordi*
Elegant trogon	*Trogon elegans*
Great plains skink	*Eumeces obsoletus*
Jaguar	*Panthera onca*
Jaguarundi	*Felis yagouaroundi*
Lesser long-nosed bat	*Leptonycteris curasoae*
Loggerhead shrike	*Lanius ludovicianus*
Lyre snake	*Trimorphodon biscutatus*
Madrean alligator lizard	*Elgaria kingii*
Mexican long-tongued bat	*Choeronycteris mexicana*
Mexican spotted owl	*Strix occidentalis lucida*
Mexican wolf	*Canis lupus baileyi*
Mojave rattlesnake	*Crotalus scutulatus*
Mountain patchnose snake	*Salvadora grahamiae*
Ocelot	*Felis pardalis*
Prairie lizard	*Sceloporus undulatus*
Red-tailed hawk	*Buteo jamaicensis*
Short-horned lizard	*Phrynosoma douglasii*
Sonora tiger salamander	*Ambystoma tigrinum stebbinsi*
Sonoran mountain king snake	*Lampropeltis pyromelana*
Big bend patchnose snake	*Salvadora deserticola*
Night snake	*Hypsiglena torquata*
Whooping crane	*Grus Americana*
Woodhouse's toad	*Bufo woodhousii*
Yaqui topminnow	*Poeciliopsis occidentalis sonorensis*

Common Name	Scientific Name
PLANTS	
Alligator juniper	*Juniperus deppeana*
Arizona agave	*Agave arizonica*
Arizona rosewood	*Vauquelinia californica*
Arizona sycamore	*Platanus wrightii*
Arizona white oak	*Quercus arizonica*
Beargrass	*Nolina microcarpa*
Blue grama	*Bouteloua gracilis*
Brickellia	*Brickellia sp.*
Cane cholla	*Opuntia spinosior*
Canelo Hills Ladies Tresses	*Spiranthes delitescens*
Catclaw acacia	*Acacia greggii*
Cochise pincushion cactus	*Coryphantha vivipara*
Desert spoon	*Dasylirion wheeleri*
Desert willow	*Chilopsis linearis*
Emory oak	*Quercus emoryi*
Fairy duster	*Calliandra eriophylla*
Hedgehog cactus	*Echinocereus pectinatus*
Honey mesquite	*Prosopis glandulosa*
Huachuca water umbrel	*Lilaeopsis schaffneriana* spp. *recurva*
Lehmann lovegrass	*Eragrostis lehmanniana*
Manzanita	*Arctostaphlos spp*
Marguay verde	*Agave salmiana crassispina*
Mexican blue oak	*Quercus oblongifolia*
Mexican piñon pine	*Pinus discolor*
Mountain mahogany	*Cercocarpus montanus*
Needle grass	*Stipa* sp.
Palmer's agave	*Agave palmeri*
Poison ivy	*Toxicodendron radicans*
Rabbit brush	*Chrysothamnus nauseosus*
Side oats grama	*Bouteloua curtipendula*
Sumac	*Rhus virens*
Wild grape	*Vitis arizonica*

APPENDIX F: LETTER FROM U.S. FISH AND WILDLIFE SERVICE REGARDING THREATENED OR ENDANGERED SPECIES

United States Department of the Interior
U.S. Fish and Wildlife Service
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
Telephone: (602) 640-2720 FAX: (602) 640-2730

In Reply Refer To:

AESO/SE
2-21-99-I-003

March 27, 2000

Memorandum

To: Natural Resource Specialist, National Park Service, Planning and Site Design, Denver, Colorado

From: Field Supervisor

RE: Coronado National Memorial – General Management Plan/EIS

This memorandum responds to your March 14, 2000, request for an inventory of threatened or endangered species, or those that are proposed to be listed as such under the Endangered Species Act of 1973, as amended (Act), which may potentially occur in your project area (Cochise County). The attached list may include candidate species as well. We hope the attached county list of species will be helpful. In future communications regarding this project, please refer to consultation number 2-21-99-I-003.

The attached list of the endangered, threatened, proposed, and candidate species includes all those potentially occurring anywhere in the county, or counties, where your project occurs. Please note that your project area may not necessarily include all or any of these species. The information provided includes general descriptions, habitat requirements, and other information for each species on the list. Also on the attached list is the Code of Federal Regulations (CFR) citation for each list and is available at most public libraries. This information should assist you in determining which species may or may not occur within your project area. Site-specific surveys could also be helpful and may be needed to verify the presence or absence of a species or its habitat as required for the evaluation of proposed project-related impacts.

Endangered and threatened species are protected by Federal law and must be considered prior to project development. If the action agency determines that listed species or critical habitat may be adversely affected by a federally funded, permitted, or authorized activity, the action agency must request formal consultation with the Service. If the action agency determines that the planned action may jeopardize a proposed species or destroy or adversely modify proposed critical habitat, the action agency must enter into a section 7 conference with the Service. Candidate species are those which are being considered for addition to the list of threatened or endangered species. Candidate species are those for which there is sufficient information to support a proposal for listing. Although candidate species have no legal protection under the Act, we recommend that they be considered in the planning process in the event that they become listed or proposed for listing prior to project completion.

If any proposed action occurs in or near areas with trees and shrubs growing along watercourses, known as riparian habitat, the Service recommends the protection of these areas. Riparian areas are critical to biological community diversity and provide linear corridors important to migratory species. In addition, if the project will result in the deposition of dredged or fill materials into waterways or excavation in waterways, we recommend you contact the Army Corps of Engineers which regulates these activities under Section 404 of the Clean Water Act.

The State of Arizona protects some plant and animal species not protected by Federal law. We recommend you contact the Arizona Game and Fish Department and the Arizona Department of Agriculture for State-listed or sensitive species in your project area.

The Service appreciates your efforts to identify and avoid impacts to listed and sensitive species in your project area. If we may be of further assistance, please feel free to contact Tom Gatz.

for Jacqueline Hanson

David L. Harlow

Attachment

cc: John Kennedy, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: **COCHISE**

08/26/1999

1)LISTED

TOTAL= 20

NAME: **CANELO HILLS LADIES' TRESSES** *SPIRANTHES DELITESCENS*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: No CFR: 62 FR 665, 01-06-97

DESCRIPTION: SLENDER ERECT MEMBER OF THE ORCHID FAMILY (ORCHIDACEAE). FLOWER: STALK 50 CM TALL, MAY CONTAIN 40 WHITE FLOWERS SPIRALLY ARRANGED ON THE FLOWERING STALK.

ELEVATION RANGE: about 5000 FT.

COUNTIES: COCHISE, SANTA CRUZ

HABITAT: FINELY GRAINED, HIGHLY ORGANIC, SATURATED SOILS OF CIENEGAS

POTENTIAL HABITAT OCCURS IN SONORA, MEXICO, BUT NO POPULATIONS HAVE BEEN FOUND.

NAME: **COCHISE PINCUSHION CACTUS** *CORYPHANTHA ROBBINSORUM*

STATUS: THREATENED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 51 FR 952, 1-9-1986

DESCRIPTION: A SMALL UNBRANCHED CACTUS WITH NO CENTRAL SPINES AND 11-17 WHITE RADIAL SPINES. THE BELL-SHAPED FLOWERS ARE BORNE ON THE ENDS OF TUBERCULES (Protrusions). FLOWERS: BELL SHAPED, PALE YELLOW-GREEN. FRUITS: ORANGE-RED TO RED

ELEVATION RANGE: >4200 FT.

COUNTIES: COCHISE AND SONORA, MEXICO

HABITAT: SEMIDESERT GRASSLAND WITH SMALL SHRUBS, AGAVE, OTHER CACTI, AND GRAMA GRASS.

GROWS ON GRAY LIMESTONE HILLS.

NAME: **HUACHUCA WATER UMBEL** *LILAEOPSIS SCHAFFNERIANA ssp RECURVA*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: No CFR: 62 FR 665, 01-06-97

DESCRIPTION: HERBACEOUS, SEMI-AQUATIC PERENNIAL IN THE PARSLEY FAMILY (UMBELLIFERAE) WITH SLENDER ERECT, HOLLOW, LEAVES THAT GROW FROM THE NODES OF CREEPING RHIZOMES. FLOWER: 3 TO 10 FLOWERED UMBELS ARISE FROM ROOT NODES.

ELEVATION RANGE: 3500-6500 FT.

COUNTIES: PIMA, SANTA CRUZ, COCHISE

HABITAT: CIENEGAS, PERENNIAL LOW GRADIENT STREAMS, WETLANDS

AND IN ADJACENT SONORA, MEXICO, WEST OF THE CONTINENTAL DIVIDE. POPULATIONS ALSO ON FORT HUACHUCA MILITARY RESERVATION. CRITICAL HABITAT IN COCHISE AND SANTA CRUZ COUNTIES (63 FR 37441)

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: COCHISE

08/26/1999

NAME: LESSER LONG-NOSED BAT *LEPTONYCTERIS CURASOAE YERBABUENAE*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 53 FR 38456, 09-30-88

DESCRIPTION: ELONGATED MUZZLE, SMALL LEAF NOSE, AND LONG TONGUE. YELLOWISH BROWN OR GRAY ABOVE AND CINNAMON BROWN BELOW. TAIL MINUTE AND APPEARS TO BE LACKING. EASILY DISTURBED.

ELEVATION RANGE: <6000 FT.

COUNTIES: COCHISE, PIMA, SANTA CRUZ, GRAHAM, PINAL, MARICOPA

HABITAT: DESERT SCRUB HABITAT WITH AGAVE AND COLUNMNAR CACTI PRESENT AS FOOD PLANTS

DAY ROOSTS IN CAVES AND ABANDONED TUNNELS. FORAGES AT NIGHT ON NECTAR, POLLEN, AND FRUIT OF PANICULATE AGAVES AND COLUMNAR CACTI. THIS SPECIES IS MIGRATORY AND IS PRESENT IN ARIZONA , USUALLY FROM APRIL TO SEPTMBER AND SOUTH OF THE BORDER THE REMAINDER OF THE YEAR.

NAME: MEXICAN GRAY WOLF *CANIS LUPUS BAILEYI*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-67; 43 FR 1912, 03-09-78

DESCRIPTION: LARGE DOG-LIKE CARNIVORE WITH VARYING COLOR, BUT USUALLY A SHADE OF GRAY. DISTINCT WHITE LIP LINE AROUND MOUTH. WEIGH 60-90 POUNDS.

ELEVATION RANGE: 4,000-12,00IFT.

COUNTIES: APACHE, COCHISE, GREENLEE, PIMA, SANTA CRUZ

HABITAT: CHAPPARAL, WOODLAND, AND FORESTED AREAS. MAY CROSS DESERT AREAS.

HISTORIC RANGE IS CONSIDERED TO BE LARGER THAN THE COUNTIES LISTED ABOVE. UNCONFIRMED REPORTS OF INDIVIDUALS IN THE SOUTHERN PART OF THE STATE (COCHISE, PIMA, SANTA CRUZ) CONTINUE TO BE RECEIVED. INDIVIDUALS MAY STILL PERSIST IN MEXICO. EXPERIMENTAL NONESSENTIAL POPULATION INTRODUCED IN THE BLUE PRIMITIVE AREA OF GREENLEE AND APACHE COUNTIES.

NAME: OCELOT *LEOPARDUS (=FELIS) PARDALIS*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 47 FR 31670; 07-21-82

DESCRIPTION: MEDIUM-SIZED SPOTTED CAT WHOSE TAIL IS ABOUT 1/2 THE LENGTH OF HEAD AND BODY. YELLOWISH WITH BLACK STREAKS AND STRIPES RUNNING FROM FRONT TO BACK. TAIL IS SPOTTED AND FACE IS LESS HEAVILY STREAKED THAN THE BACK AND SIDES.

ELEVATION RANGE: <8000 FT.

COUNTIES: SANTA CRUZ, PIMA, COCHISE

HABITAT: HUMID TROPICAL & SUB-TROPICAL FORESTS, SAVANNAHS, AND SEMI-ARID THORNSCRUB.

MAY PERSIST IN PARTLY-CLEARED FORESTS, SECOND-GROWTH WOODLAND, AND ABANDONED CULTIVATION REVERTED TO BRUSH. UNIVERSAL COMPONENT IS PRESENCE OF DENSE COVER. UNCONFIRMED REPORTS OF INDIVIDUALS IN THE SOUTHERN PART OF THE STATE CONTINUE TO BE RECEIVED.

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: **COCHISE**

08/26/1999

NAME: **YAQUI TOPMINNOW** *POECILIOPSIS OCCIDENTALIS SONORIENSIS*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-1967

DESCRIPTION: SMALL (2 INCHES) TOPMINNOW GUPPY-LIKE, LIVE BEARING, LACKING DARK SPOTS. BREEDING MALES JET BLACK WITH YELLOW FINS.

ELEVATION RANGE: <4500 FT.

COUNTIES: COCHISE

HABITAT: SMALL TO MODERATE SIZED STREAMS, SPRINGS, & CIENEGAS GENERALLY IN SHALLOWS

NAME: **BALD EAGLE** *HALIAEETUS LEUCOCEPHALUS*

STATUS: THREATENED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 60 FR 35999, 07-12-95

DESCRIPTION: LARGE, ADULTS HAVE WHITE HEAD AND TAIL. HEIGHT 28 - 38"; WINGSPAN 66 - 96". 1-4 YRS DARK WITH VARYING DEGREES OF MOTTLED BROWN PLUMAGE. FEET BARE OF FEATHERS.

ELEVATION RANGE: VARIES FT.

COUNTIES: YUMA, LA PAZ, MOHAVE, YAVAPAI, MARICOPA, PINAL, COCONINO, NAVAJO, APACHE, SANTA CRUZ, PIMA, GILA, GRAHAM, COCHISE

HABITAT: LARGE TREES OR CLIFFS NEAR WATER (RESERVOIRS, RIVERS AND STREAMS) WITH ABUNDANT PREY

SOME BIRDS ARE NESTING RESIDENTS WHILE A LARGER NUMBER WINTERS ALONG RIVERS AND RESERVOIRS. AN ESTIMATED 200 TO 300 BIRDS WINTER IN ARIZONA. ONCE ENDANGERED (32 FR 4001, 03-11-1967; 43 FR 6233, 02-14-78) BECAUSE OF REPRODUCTIVE FAILURES FROM PESTICIDE POISONING AND LOSS OF HABITAT, THIS SPECIES WAS DOWN LISTED TO THREATENED ON AUGUST 11, 1995. ILLEGAL SHOOTING, DISTURBANCE, LOSS OF HABITAT CONTINUES TO BE A PROBLEM. SPECIES HAS BEEN PROPOSED FOR DELISTING (64 FR 36454) BUT STILL RECEIVES FULL PROTECTION UNDER ESA.

NAME: **CACTUS FERRUGINOUS PYGMY-OWL** *GLAUCIDIUM BRASILIANUM CACTORUM*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: No CFR: 62 FR 10730, 3-10-97

DESCRIPTION: SMALL (APPROX. 7"), DIURNAL OWL REDDISH BROWN OVERALL WITH CREAM-COLORED BELLY STREAKED WITH REDDISH BROWN. SOME INDIVIDUALS ARE GRAYISH BROWN

ELEVATION RANGE: <4000 FT.

COUNTIES: MARICOPA, YUMA, SANTA CRUZ, GRAHAM, GREENLEE, PIMA, PINAL, GILA, COCHISE

HABITAT: MATURE COTTONWOOD/WILLOW, MESQUITE BOSQUES, AND SONORAN DESERTSCRUB

RANGE LIMIT IN ARIZONA IS FROM NEW RIVER (NORTH) TO GILA BOX (EAST) TO CABEZA PRIETA MOUNTAINS (WEST). ONLY A FEW DOCUMENTED SITES WHERE THIS SPECIES PERSISTS ARE KNOWN, ADDITIONAL SURVEYS ARE NEEDED. CRITICAL HABITAT IN PIMA, COCHISE, PINAL, AND MARICOPA COUNTIES (64 FR 37419).

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: COCHISE

08/26/1999

NAME: WHOOPING CRANE *GRUS AMERICANA*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-1967; 43 FR 20938, 05-15-78

DESCRIPTION: TALLEST AMERICAN BIRD (UP TO 5 FEET) SNOWY WHITE, LONG NECK AND LEGS, BLACK WING TIPS, RED CROWN, AND BLACK WEDGE SHAPED PATCH OF FETHERS BEHIND ITS EYE.

ELEVATION RANGE: 4500 FT.

COUNTIES: COCHISE

HABITAT: MARSHES, PRAIRIES, RIVER BOTTOMS

BIRDS IN THE ROCKY MOUNTAIN POPULATION ARE OCCASIONAL VISITORS IN ARIZONA DURING MIGRATION. USUALLY NEAR WILCOX PLAYA.

NAME: SONORA TIGER SALAMANDER *AMBYSTOMA TIGRINUM STEBBINSI*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: No CFR: 62 FR 665, 01-06-97

DESCRIPTION: 2.6 TO 4.9" SNOUT-VENT LENGTH WITH LIGHT-COLORED BANDS ON A DARK BACKGROUND. AQUATIC LARVAE ARE UNIFORM DARK COLOR WITH PLUME-LIKE GILLS AND TAIN FINS.

ELEVATION RANGE: 4000-6300 FT.

COUNTIES: SANTA CRUZ, COCHISE

HABITAT: STOCK TANKS AND IMPOUNDED CIENEGAS IN SAN RAFAEL VALLEY, HUACHUCA MOUNTAINS

ALSO OCCURS IN THE FOOTHILLS OF THE EAST SLOPE OF THE PATAGONIA AND HUACHUCA MOUNTAINS. POPULATIONS ALSO ON FORT HUACHUCA.

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: COCHISE

08/26/1999

3) CANDIDATE

TOTAL= 4

NAME: LEMMON FLEABANE *ERIGERON LEMMONII*

STATUS: CANDIDATE CRITICAL HAB No RECOVERY PLAN: No CFR:

DESCRIPTION: A PROSTRATE PERENNIAL IN THE SUNFLOWER FAMILY. STEMS AND LEAVES ARE DENSELY HAIRY. FLOWERS LOOK LIKE SMALL DELICATE DAISIES, WITH WHITE TO LIGHT PURPLE OUTER PETALS AND YELLOW INNER PETALS.

ELEVATION RANGE: 1500-6000 FT.

COUNTIES: COCHISE

HABITAT: GROWS IN DENSE CLUMPS IN CREVICES, LEDGES, AND BOULDERS IN CANYON BOTTOMS IN PINE-OAK WOODLAND

ONE SITE ON FORT HUACHUCA MILITARY RESERVATION

NAME: GILA CHUB *GILA INTERMEDIA*

STATUS: CANDIDATE CRITICAL HAB No RECOVERY PLAN: No CFR:

DESCRIPTION: DEEP COMPRESSED BODY, FLAT HEAD. DARK OLIVE-GRAY COLOR ABOVE, SILVER SIDES. ENDEMIC TO GILA RIVER BASIN.

ELEVATION RANGE: 2000 - 3500 FT.

COUNTIES: SANTA CRUZ, GILA, GREENLEE, PIMA, COCHISE, GRAHAM, YAVAPAI

HABITAT: POOLS, SPRINGS, CIENEGAS, AND STREAMS

MULTIPLE PRIVATE LANDOWERS, INCLUDING THE NATURE CONSERVANCY, THE AUDUBON SOCIETY, AND OTHERS. ALSO FT. HUACHUCA. SPECIES ALSO FOUND IN SONORA, MEXICO.

NAME: HUACHUCA SPRINGSNAIL *PYRGULOPSIS THOMPSONI*

STATUS: CANDIDATE CRITICAL HAB No RECOVERY PLAN: No CFR:

DESCRIPTION: VERY SMALL (1.7-3.2mm) CONICAL SHELL. IDENTIFICATION MUST BE VERIFIED BY CHARARCTERISTICS OF REPRODUCTIVE ORGANS.

ELEVATION RANGE: 4500-6000 FT.

COUNTIES: COCHISE, SANTA CRUZ

HABITAT: AQUATIC AREAS, SMALL SPRINGS WITH VEGETATION SLOW TO MODERATE FLOW.

INDIVIDUALS FOUND ON FIRM SUBSTANCES (ROOTS, WOOD, AND ROCKS) OTHER POPULATIONS FOUND ON FORT HUACHUCA MILITARY PROPERTY

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: COCHISE

09/24/1998

CONSERVATION AGREEMENT TOTAL= 1

NAME: RAMSEY CANYON LEOPARD FROG RANA SUBAQUAVOCALIS

STATUS: NONE CRITICAL HAB: No RECOVERY PLAN: No CFR:

DESCRIPTION: BROWN OR GREEN FROG, 3.5 TO 4 INCHES LONG; SPOTS ROUNDED WITH LIGHT BORDERS; DORSOLATERAL FOLDS ARE INTERRUPTED POSTERIORLY AND DEFLECTED MEDIALLY; YELLOWISH PIGMENTATION ON THE GROIN WHICH MAY EXTEND INTO THE POSTERIOR VENTER ELEVATION RANGE: 4,000 FT FT.

COUNTIES: COCHISE

HABITAT: STREAM AND PONDED AQUATIC HABITATS

CONSERVATION AGREEMENT BETWEEN THE SERVICE, ARIZONA GAME AND FISH DEPARTMENT, THE NATURE CONSERVANCY, BUREAU OF LAND MANAGEMENT, CORONADO NATIONAL FOREST, THE US ARMY INTELLIGENCE CENTER AND FORT HUACHUCA, AND A PRIVATE LANDOWNER WAS FINALIZED JULY 1998

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