



National Park Service
U.S. Department of the Interior
Coronado National Memorial
Hereford, Arizona

Flood Mitigation Road Repairs Montezuma Wash Restoration

Environmental Assessment

June 2009



Photo illustrates erosion that occurred around the historic culverts as a result of the August 2008 flood event. Damage to East Montezuma Canyon Road and sediment deposition is also visible.

Flood Mitigation and Road Repair Project

Environmental Assessment

Summary

The National Park Service (NPS) at Coronado National Memorial in cooperation with the Federal Highways Administration (FHWA) is proposing to re-surface, restore and rehabilitate the previously paved 3.5 miles of roadway within the memorial and to provide a sustainable drainage system along the paved portion of the roadway. The purposes of the project is to address healthy and safety concerns related to the aging roadway infrastructure that has reached the end of its structural integrity, enhance the experience of park visitors and restore the aggraded channel within Montezuma Wash. Extreme flooding in recent years has altered the channel of Montezuma Wash and it is currently threatening the stability of the road. The Coronado Cave Trail is currently located within the channel of Montezuma Wash. Due to the extreme flooding events experienced in the past few years maintaining this portion of the trail has come at an increased expense and a repetitive maintenance issue. East Montezuma Canyon Road has been determined eligible for listing on the National Register of Historic Places by the Arizona State Historic Preservation Officer (SHPO). Informal vehicle pull offs along the road shoulder have developed without environmental planning. These pull off areas are primarily used by law enforcement agencies but occasionally they are used by park visitors. The memorial's location on the international border results in a high volume of law enforcement vehicular traffic and the parking along the road shoulder has increased in recent years.

An Environmental Assessment has been prepared in compliance with the National Environmental Policy Act (NEPA) to provide the decision-making framework that 1) analyzes a reasonable range of alternatives to meet project objectives, 2) evaluates issues and impacts to park resources and values, and 3) identifies mitigation measures to lessen the degree or extent of these impacts. This Environmental Assessment evaluates two alternatives for rehabilitation of the roadway, channel and trail.

Alternative 1—No Action Alternative: In this alternative the emergency repairs made to date would allow the road to remain open but unimproved. Stream bank erosion along the roadway close to Montezuma Wash would continue to occur. The continued erosion of the stream banks could put the historic structures of the roadway in jeopardy of collapse and failure. This alternative could lead to increased and lengthy road closures and possibly the complete failure of the road. Road closures at the memorial could lead to safety and law enforcement issues related to the ever present need to maintain national security along our shared border with Mexico. The Coronado Cave trail would remain in Montezuma Wash and annual repairs would be anticipated. The informal pull offs created by law enforcement and visitors would continue to have environmental impacts through the disturbance and damage to roadside soils, vegetation. The lower channel of Montezuma Wash would remain aggraded and would continue to function poorly.

Alternative 2—Preferred Alternative: Alternative B would protect historic structures as well as improve the roadway through the rehabilitation of existing pavement, improve the inadequate road drainage system and would formalize roadside pull offs. Approximately three concrete low water crossings would be installed to provide for water and sediment transport to Montezuma Wash. These crossings would be located at contributing washes newly created in recent storm events. This project would address the ongoing concerns for maintenance of Coronado Cave Trail by moving the trailhead and trail out of the Montezuma Wash. The project proposes to accelerate the natural restoration process (within the project area) of Montezuma Wash. The restoration would permit the wash to function more naturally and return the channel to its pre-flood condition.

This Environmental Assessment/Assessment of Effect will be on public review for 30 days beginning June 27, 2009 and ending on July 27, 2009. The memorial encourages public participation and encourages you to comment on this proposed project examined in this Environmental Assessment. Written suggestions, comments, and concerns regarding the proposed project can be submitted online at the National Park Service (NPS) Planning, Environment, and Public Comment (PEPC) website at: <http://parkplanning.nps.gov/>. If you are not able to submit comments electronically through this website, you may submit written comments to the address below.

Superintendent
Coronado National Memorial
4101 East Montezuma Canyon Road
Hereford, Arizona 85615

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment -including your personal identifying information - may be made publicly available at any time. While you can ask us to withhold your personal identifying information from public we cannot guarantee that we would be able to do so. We would always make submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public.

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PURPOSE AND NEED

Introduction

Coronado National Memorial (memorial) is located in Cochise County in southeast Arizona, 21 miles south of Sierra Vista. The memorial shares 3.3 miles of international border between the United States and Mexico. The memorial was established as an international memorial on August 18, 1941, and as a national memorial on November 8, 1952, to commemorate the first major European exploration of the American Southwest. The memorial is a cultural area in a natural setting composed of semi-desert grasslands and oak woodlands in Montezuma Canyon at the southern end of the Huachuca Mountain Range.

The road through the memorial is paved to about one 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 on to Nogales – a slow, scenic drive. The memorial contains superlative views of the San Pedro River Valley. The historic road was constructed by the Civilian Conservation Corps (CCC) in 1933 to develop a shorter route for access to ranches to the west prior to the parks authorization.

The purpose of this environmental assessment is to examine the environmental impacts associated with the proposal to re-surface, restore and rehabilitate the previously paved 3.5 miles of roadway within the memorial and to provide a sustainable drainage system (low water crossings) along the paved portion of the roadway. Extreme flooding in recent years has altered the channel of Montezuma Wash and it is currently threatening the stability of the road. The Montezuma Cave Trail is currently located within the channel of Montezuma Wash for approximately 1/4 of a mile before it turns north to the cave. Due to the extreme flooding events experienced in the past few years maintaining this portion of the trail has come at an increased expense and a repetitive maintenance issue. The trail has been rebuilt two times in three years. East Montezuma Canyon Road has been determined eligible for listing on the National Register of Historic Places by the Arizona State Historic Preservation Officer (SHPO). Informal vehicle pull offs along the road shoulder have developed without environmental planning. These pull off areas are primarily used by law enforcement agencies but are occasionally used by park visitors. The memorial's location on the International Border results in a high volume of law enforcement vehicular traffic and parking along the road shoulder has increased in recent years. This Environmental Assessment has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, regulations of the Council on Environmental Quality (CEQ) (40 CFR 1508.9), and the National Park Service Director's Order (DO)-12 (*Conservation Planning, Environmental Impact Analysis, and Decision-making*).

Background

Coronado National Memorial of the National Park Service, in cooperation with the Federal Highway Administration, is proposing to rehabilitate the paved portion of East Montezuma Canyon Road located within the first 3.5 miles of the memorial. East Montezuma Canyon Road is the major thoroughfare through Coronado National Memorial and one of a few access roads to reach the west-side of the Huachuca Mountains. The road is the primary route for visitors to access park facilities. The portion of the roadway that has been most affected by recent flooding is located just west of the visitor center beside Montezuma Wash where the proximity of the road to the wash is the closest through the canyon. If the road were to fail at this location, visitors, ranchers, United States Forest Service (USFS) personnel, Border Patrol (BP) personnel and park staff would not be able to easily access areas to the west by vehicle. From the visitor center East Montezuma Canyon Road leads to the memorial picnic area, all the hiking trails, then reaches Montezuma Pass before it passes into Coronado National Forest and continues to Parker Lake in Santa Cruz County. An alternate route to reach the west side of the Huachuca Mountains would add approximately 100 miles to the trip.

The Department of Homeland Security Border Patrol agents use East Montezuma Canyon Road on a daily basis 24 hours a day 7 days a week to gain access to the international border. The Border Patrol must have access to the area to continue its mission of border security. It is imperative that other law enforcement staff (NPS, USFS and Sheriff Department) have good vehicle access to the area to maintain visitor and resource protection.

The historic road was constructed in 1933 to develop a shorter route for access to ranches to the west. The construction of the East Montezuma Canyon Road shortened the distance between ranches in the area from 103 miles to 11 miles. The road predates the establishment of the memorial. A two mile stretch of road at the top of Montezuma Pass remains unpaved and possesses a high degree of historical integrity. The roadway is primarily used today by park visitors and staff, Border Patrol, Forest Service personnel, hunters, and unfortunately by human and drug smugglers from Mexico.

Figure 1. Area Location – Coronado National Memorial



Figure 2 – Coronado National Memorial Proposed Project Area on East Montezuma Canyon Road

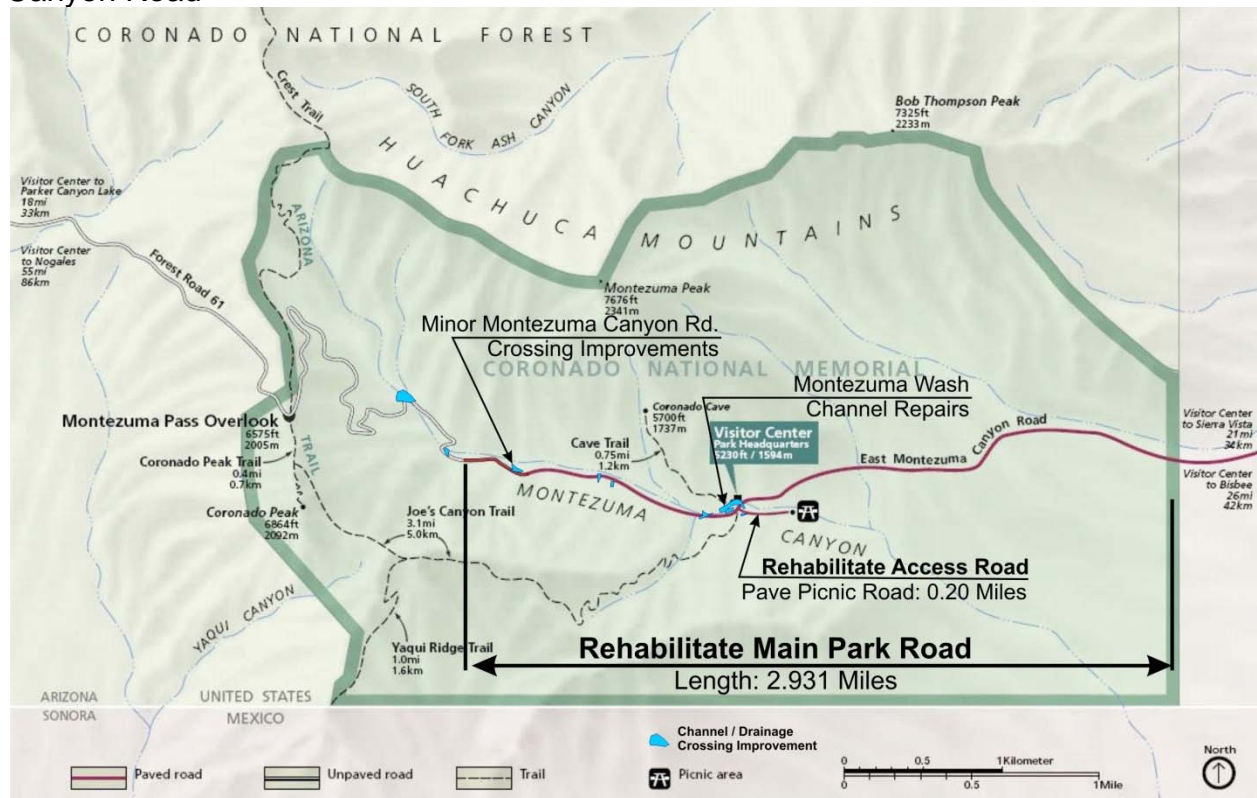


Figure 3: The photo above shows the amount of sediment that was deposited and moved through the channel of Montezuma Wash during the July 2006 flood event. This picture was taken looking southeast at the Warren Crossing after NPS opened the road to emergency traffic only.



Figure 4 Picture illustrates the road damage caused to East Montezuma Canyon Road after the July 2008 flooding event. Photo taken looking east toward the visitor center and across two large historic culverts (not visible) that were plugged during the event.



Purpose and Need

The purpose of the proposal is to provide a safe and sustainable roadway through Coronado National Memorial, restore a functioning stream channel through the aggraded section of Montezuma Wash and preserve the historic structure of the roadway.

The proposed project has several objectives:

1. Meet federal and state safety standards for highways on federal lands.
2. Protect cultural resource values through preservation of the historic roadway and associated features as required by the National Historic Preservation Act.
3. Protect natural resource values while restoring the lower reach of Montezuma Wash within the memorial to a functioning condition thus minimizing adverse impacts to historic structures.
4. Minimize impacts to natural resources from inappropriate parking along road shoulder.
5. Protect the roadway from future damage by developing a sustainable protective drainage system.
6. Develop a sustainable Coronado Cave trail and trailhead.

The proposed work is needed because the road has been damaged by extreme flooding events that occurred on July 31, 2006 and again in a major flood event on July 27, 2008. These flooding events have substantially altered the watershed. The 2006 event resulted in numerous debris flows and landslides that buried the road under several feet of sediment and closed the road for three months. The debris flows from these events were so extreme and has filled the channel with such a large amount of sediment that it is predicted it would take decades to naturally move and reestablish a stable stream channel. The stream only has enough power to convey these larger particles at very high discharges that occur infrequently. The result is local aggregation and over widening of affected stream channels (NCD, 2009). The low water crossings currently in place were buried under 10-15 feet of sediment after the 2006 flood event and less than a foot of sediment after the 2008 event.

Field mapping and analysis of aerial photographs and satellite imagery were used by Arizona State Geologist Ann Youberg to identify 113 hillslope failures which coalesced into 65 debris flows after the 2006 flood event (Figure 5). These numbers include hillslope failures and debris flows on adjacent Coronado National Forest land west and north of the memorial. Runoff and flooding caused damage to the road with significant flooding and sediment movement in Montezuma Wash and from several of the 2006 debris-flow channels on the south-side of the road between the Visitor Center and the lower crossing (Figure 5).

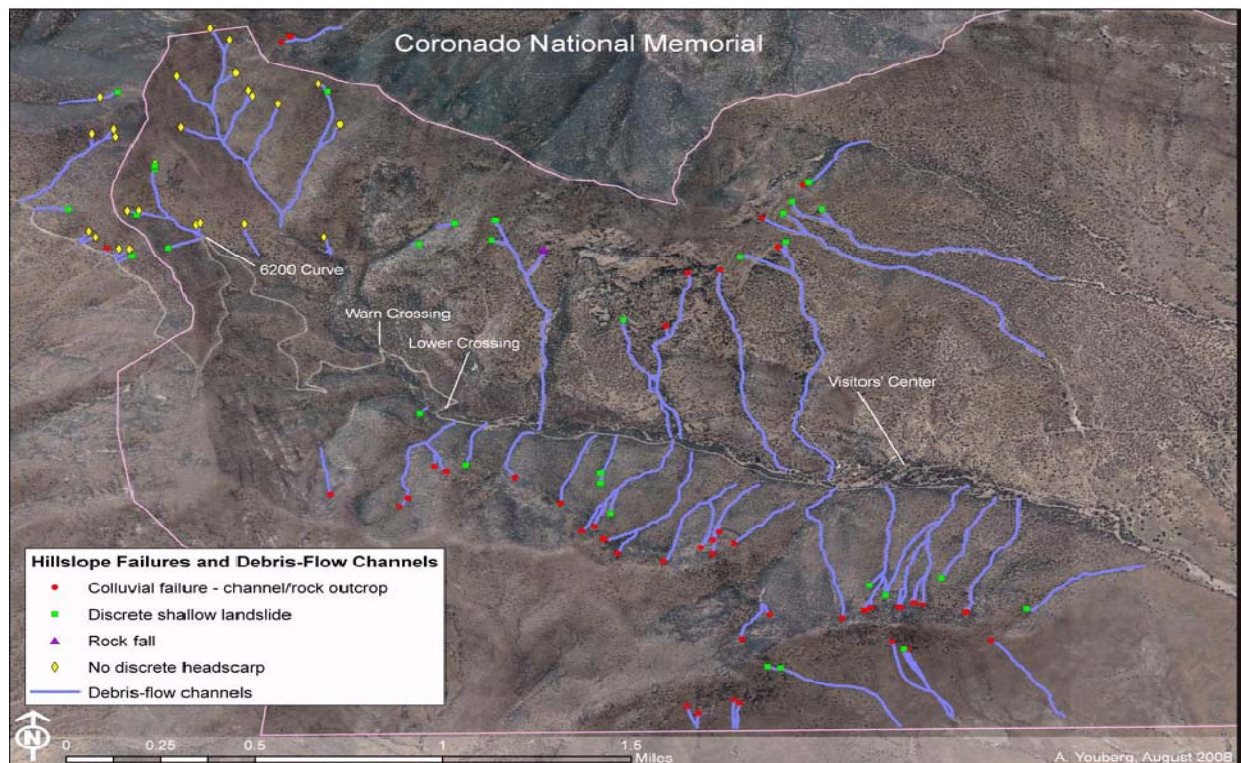


Figure 5. The debris-flow channels that crossed the East Montezuma Canyon Road during the August 2006 flood event (Youberg, 2008).

Relationship to Other Plans and Policies

Current plans and policy that pertain to this proposal include the 2004 Coronado National Memorial *General Management Plan* (NPS 2004), and the 2006 *Management Policies* (NPS 2006). Following is more information on how this proposal meets the goals and objectives of these plans and policies:

- The 2004 Coronado National Memorial General Management Plan, states the roadway would be preserved as a historic structure. More pullouts and waysides would be developed along the main road. The main road is considered one of the primary visitor service resources at the memorial.
- The proposal is consistent with the goals and objectives of the 2006 *National Park Service Management Policies* (NPS 2006) which provides guidance for management of all national park units. Roads are addressed in Section 9.2.1, which states “park roads will be well constructed, sensitive to natural and cultural resources, reflect the highest principles of park design, and enhance the visitor experience.”
- The proposed project is consistent with National Historic Preservation Act (NHPA) which states that the NPS is responsible to preserve, conserve and encourage the continuation of the diverse traditional historic traditions that underlie and are a living expression of our American heritage.
- The proposal is consistent with the goals and objectives of the 2006 National Park Service Management Policies (NPS 2006) that state in managing floodplains and

watersheds or stream processes on park lands the NPS will protect, preserve, and restore the natural resources and functions of these resources. If development or actions that could adversely affect the natural resources occur, the use of non structural measures would be implemented as much as practicable reduce hazards to human life and property while minimizing the impact to the natural resources of floodplains and watershed and stream processes.

Appropriate Use

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

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

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

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

Environmentally sensitive planning as well as sizing construction equipment, mitigation measures and construction methods would ensure that unacceptable impacts to park resources and values would not occur. The proposed rehabilitation of the road and Montezuma Wash is consistent with the memorial's General Management Plan, and other related NPS plans. An access roadway is a common and vital structure in most park units. Through the proposed rehabilitation of the roadway and wash it is thought that the actions would protect the historic structures as well as maintain the wash and roadway. The plans are consistent with the park's general management plan and other related park plans. With this in mind, the NPS finds that proposed project is an acceptable use at Coronado National Memorial.

Internal and Public Scoping

Scoping is a process to identify the resources that may be affected by a project proposal, and to explore possible alternative ways of achieving the proposal while minimizing adverse impacts. Coronado National Memorial conducted both internal

scoping with appropriate National Park Service staff and external scoping with the public and interested/affected groups and agencies.

Internal scoping was conducted by an interdisciplinary team of professionals on January 8, 2009, April 10, 2009 and April 13, 2009. Interdisciplinary team members met to discuss the purpose and need for the project; various alternatives; potential environmental impacts; past, present, and reasonably foreseeable projects that may have cumulative effects; and possible mitigation measures. Over the course of the project, team members conducted additional meetings to view and evaluate the proposed site with construction engineers and subject matter experts.

External scoping was initiated with the distribution of a scoping letter to inform the public of the proposal to restore and rehabilitate East Montezuma Canyon Road damaged by flooding events in 2006 and 2008. The goal was to identify problems and to generate input for the preparation of this Environmental Assessment. The scoping letter dated February 21, 2009 was mailed to 114 addresses including landowners adjacent to the Memorial, various federal and state agencies, affiliated Native American tribes (see Table 1), local governments and local news agencies. A press release was also issued with local print and electronic media.

During the 30-day scoping period, four public responses were received including the Hopi Tribe which responded with no objection to the proposed project and requested to be informed if prehistoric objects were discovered during the project. More information regarding scoping can be found in *Comments and Coordination*.

Table 1 Affiliated Tribes of Coronado National Memorial

Ak Chin Indian Community	Yavapai-Apache Tribe
Fort McDowell Tavapai Nation	Pascua Yaqui Tribe
Fort Sill Apache Tribe of Oklahoma	Hopi Tribe
Mescalero Apache Tribe	Tonto Apache Tribe
Pueblo of Zuni	San Carlos Apache Tribe
Tohono O'odham Nation	White Mountain Apache Tribe
Salt River Pima – Maricopa Indian Community	

Impact Topics Retained For Further Analysis

Impact topics for this project have been broadly identified on the basis of federal laws, regulations, and orders; National Park Service *2006 Management Policies*; in addition the National Park Service at Coronado National Memorial have refined this topic analysis through internal and external scoping process. The staff at Coronado National Memorial, in consensus with subject matter experts, has determined the need retain the following subject areas for further analysis within this environmental assessment: Visitor Use and Experience, Park Operations, Vegetation, Geology and Soils. For each of these topics, the following text also describes the existing setting or baseline conditions (i.e. affected environment) within the project area. This information would be used to

analyze impacts against the current conditions of the project area in the *Environmental Consequences* chapter.

Visitor Use and Experience

According to *2006 Management Policies*, the enjoyment of park resources and values by people is part of the fundamental purpose of all park units (NPS 2006). The National Park Service is committed to providing appropriate, high quality opportunities for visitors to enjoy the parks, and would maintain within the parks an atmosphere that is open, inviting, and accessible to every segment of society. Further, the National Park Service would provide opportunities for forms of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources found in the parks.

No fee is required to enter the 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 tours, arrive by bus. Many visitors are year round or seasonal residents of southern Arizona who make day trips to the memorial. The memorial's facilities include a 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 memorial provides a variety of visitor use activities, including hiking, picnicking, wildlife and scenic viewing. Bird watching is a common visitor activity due the variety and abundance of birds found in the Huachuca Mountains.

Coronado Cave is a 600 foot long limestone cave, accessible by a one-way .75 mile long trail that begins at the visitor center. The trail remains in the wash for approximately .25 mile. The trailhead and trail within the wash have been closed numerous times in recent history due to flood damage.

Coronado National Memorial hosted approximately 80,000 visitors in 2008. Recreational visits have increased by 87% over the past 20 years, from 47,825 in 1981 to 89,523 in 2000. Visitation is highest in February, March and April. Many school groups visit in May. The busiest week usually is the one week between Christmas and New Year's Day.

Most visitors go to the higher elevation sites in the memorial. The lower grasslands are little used for recreation. Maintaining the East Montezuma Canyon Road in good condition would be considered a positive impact for visitors. Because the proposed project would alter some visitor activities (such as moving the trailhead to Coronado Cave Trail) and cause delays and closures during construction visitor use and experience has been carried forward for further analysis.

Park Operations

Park staff members are assigned to the following divisions: interpretation, law enforcement, facility management, resource management and administration. The total number of permanent and seasonal staff fluctuates each year. With the recent national

emphasis on border security the majority of the park staff is employed within the law enforcement division. The memorial is in an area frequently used by smugglers of undocumented aliens and illegal drugs. This creates a potential danger to visitors; however they are usually unaware of these activities.

There are approximately 17 pull offs used primarily by law enforcement, and occasionally by visitors and staff along East Montezuma Canyon Road. These pull offs have been formed in locations where law enforcement have needed repeated access to the grasslands to pursue and apprehend undocumented illegal aliens, human or drug smugglers.

The NPS Management Policies (2006) recognize that there is a maintenance responsibility and cost for every asset administered by the NPS. The policies state that the NPS will provide a safe, sanitary, environmentally protective and aesthetically pleasing environment for park visitors and employees; protect the physical integrity of facilities; and preserve or maintain facilities in their optimum sustainable condition to the greatest extent possible. Maintenance of the installed low water crossings and culverts remain a continuing maintenance task for staff. Because both alternatives could affect the memorial operations, the topic is analyzed in detail in this document.

Geology and Soils

According to the National Park Service's *2006 Management Policies*, the National Park Service would preserve and protect geologic resources and features from adverse effects of human activity, while allowing natural processes to continue (NPS 2006). These policies also state that the National Park Service would strive to understand and preserve the soil and geologic resources of park units and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources.

Land management practices, such as construction of the East Montezuma Canyon Road, along with natural geologic processes, have shaped the Montezuma Canyon. The Montezuma Wash is a dynamic system that continues to evolve, reshape, and shift within the flood plain. Large storm events in recent history have lead to monumental changes in soil erosion and geologic processes within the memorial.

The Huachuca Mountains consist of a primary central ridge, oriented along a northwest to southeast trending axis that is about 25 mi long and 4 mi wide. The central ridge is secondarily faulted and dissected with numerous canyons heading along the ridge and draining east and west. Miller Peak, 0.25 miles north of the memorial, reaches an elevation of 9,445 ft (Wallmo 1955; Toolin 1980). Elevations in the memorial range from 4,700 ft in the southeastern corner to 7,676 ft at Montezuma Peak along the northern boundary. Steep terrain predominates in the northern and western portions, particularly in Montezuma Canyon, though the eastern scarp rises most steeply at higher elevations. A portion of the crest but primarily flanking on the east of the ridgeline are exposures of Paleozoic age sedimentary carbonates (Naco Group, etc). Karsting is

found within the Paleozoics in this mountain range. The southeastern quarter of the memorial is a broad grassland plain dissected by numerous drainages. The eastern and southern portions of the Huachuca Mountains, including the memorial, drain into the San Pedro River.

Soils in Coronado National Memorial are variable, with soil depths ranging from less than 20 inches on steeper slopes to more than 60 inches on the lower slopes. They typically are high in rock fragments. The soils in the project area are primarily Gardencan complex, Gardencan-Larque complex, and Gardencan-Terrarossa complex (Denny and Peacock, 2004), the pH for all three of these groups in the top 6" ranges from 5.6-7.3, the percent clay can be up to 18%. Erosion potential associated with many of the soils at the memorial fall in the high range. These soil types generally have rapid runoff potential and low water-holding capacity.

New soil disturbance would occur along the road shoulder for one to three foot on both sides, with the drainage protection measures proposed, within the footprint of the proposed cave trail parking lot and trailhead location and with the channel restoration. Application of mitigation measures would reduce construction impacts to soil. Given the level of disturbance to the soils and the streambed geology in the project area and the level of disturbance created by recent flooding, the proposed actions will be retained for further analysis in this document.

Vegetation

According to the National Park Service's 2006 *Management Policies*, the National Park Service strives to maintain all components and processes of naturally evolving park unit ecosystems, including the natural abundance, diversity, and ecological integrity of plants (NPS 2006).

There have been five studies on vegetation at the memorial. The memorial has kept a plant list of all plant species identified within its boundaries. Ruffner and Johnson (1991) mapped the vegetation of the memorial, as well as created a plant list based on the memorial's vegetation list and specimens previously accessioned into the herbaria at Arizona State University and the University of Arizona. Four biotic communities occur in the memorial:

- Oak-Mexican Pinyon Pine-Juniper Woodland Association,
- Grama Grass (*Bouteloua* spp.)-Mixed Grass-Mixed Shrub Grassland Association,
- Western Honey Mesquite (*Prosopis glandulosa*)-Mixed Short Tree Woodland Association,
- and Arizona Sycamore (*Platanus wrightii*)- Arizona Walnut (*Juglans major*)-Oak Riparian Forest Association.

The most extensive biotic community in the memorial is the Oak-Mexican Pinyon Pine-Juniper Woodland Association covering 3,400 acres of the memorial (total memorial acreage is 4,750) (Ruffner, 1991).

The restoration to the channel in Montezuma wash, the low water crossings and road repairs are located within the Arizona Sycamore (*Platanus wrightii*)-Arizona Walnut (*Juglans major*)-Oak Riparian Forest Association as described by Ruffner and Johnson. It is a mixed-broadleaf forest community that often forms a well-developed gallery, but has a depauperate understory flora. This association occurs along major and secondary drainages in which water is perennial or seasonally intermittent, such as in middle and upper Montezuma Canyon. Consequently, this association comprises only about 100 acres, a minor portion of the memorial. Plant species typical of this association include Arizona white oak, Arizona rosewood (*Vauquelinia californica*), Arizona sycamore, catclaw acacia (*Acacia greggii*), manzanita, brickellia (*Brickellia* sp.), wild grape (*Vitis arizonica*), and needle grass (*Stipa* sp.).

From the east entrance to the memorial to the visitor center, Ruffner and Johnson described this lower portion of the proposed project area as being largely composed of the Grama Grass (*Bouteloua* spp.)-Mixed Grass-Mixed Shrub Grassland Association is largely a Chihuahuan semidesert grassland community dominated by perennial grasses and shrubs. This association encompasses over 1,000 acres in the eastern third of the memorial. Characteristic plant species include fairy duster (*Calliandra eriophylla*), rabbit brush (*Chrysothamnus nauseosus*), hedgehog cactus (*Echinocereus pectinatus*), Palmer agave (*Agave parryi*), Lehman lovegrass (*Eragrostis lehmanniana*), and blue grama (*Bouteloua gracilis*). Lehman lovegrass, a species introduced from South Africa, appears to be spreading naturally throughout much of southern Arizona to the detriment of more palatable native grasses (Brown 1982). Arizona white oak, Emory oak, and honey mesquite (*Prosopis glandulosa*) are scattered throughout the habitat.

The proposed parking area for the Coronado Cave trail was once used as an informal parking lot and shows signs of this previous disturbance. Some impacts to vegetation would occur as a result of the proposed road restoration project, construction of a new parking lot, drainage improvement, channel restoration, embankment protection and moving the cave trail from the wash. These impacts to vegetation are in highly disturbed areas of the memorial. Some trees may need to be removed to allow construction equipment access to the area to complete the restoration efforts within the wash. There are trees along the road shoulder that stand within the wash at a location of a proposed low water crossing. These trees are vulnerable to failure due to the changes in the geology and water flow since the flooding events of 2006 and 2008. The impact to vegetation is considered minor but the NPS has chosen to carry this impact topic forward due to the memorial's location in a desert ecosystem, further analysis is considered prudent for this topic so it will be carried forward.

Impact Topics Dismissed From Further Consideration

Some impact topics have been dismissed from further consideration, as listed below. During internal scoping, the park's interdisciplinary team conducted a preliminary analysis of resources to determine the context, duration, and intensity of effects that the proposal may have on those resources. If the magnitude of effects was determined to be at the negligible or minor level, there is no potential for significant impact and further impact analysis is unnecessary, therefore the resource is dismissed as an impact topic.

If however, during internal scoping and further investigation, resource effects still remain unknown, or are more at the minor to moderate level of intensity, and the potential for significant impacts is likely, then the analysis of that resource as an impact topic is carried forward.

For purposes of this section, an impact of negligible intensity is one that is “at the lowest levels of detection, barely perceptible, and not measurable.” An impact of minor intensity is one that is “measurable or perceptible, but is slight, localized, and would result in a limited alteration or a limited area.” The rationale for dismissing these specific topics is stated for each resource.

Historic Structures

The National Park Service, as steward of many of America's most important cultural resources, is charged to preserve historic properties for the enjoyment of present and future generations. Management decisions and activities throughout the National Park System must reflect awareness of the irreplaceable nature of these resources. The National Park Service would protect and manage cultural resources in its custody through effective research, planning, and stewardship and in accordance with the policies and principles contained in the 2006 Management Policies and the appropriate Director's Orders.

Section 106 of the National Historic Preservation Act, as amended in 1992 (16 USC 470 *et seq.*); the National Park Service's Director's Order-28 *Cultural Resource Management Guideline*; and National Park Service 2006 *Management Policies* require the consideration of impacts on historic properties that are listed on or eligible to be listed in the National Register of Historic Places. The National Register is the nation's inventory of historic places and the national repository of documentation on property types and their significance. The above-mentioned policies and regulations require federal agencies to coordinate consultation with State Historic Preservation Officers regarding the potential effects to properties listed on or eligible for the National Register of Historic Places.

The term “historic structures” refers to both historic and prehistoric structures, which are defined as constructions that shelter any form of human habitation or activity. The East Montezuma Canyon Road has been determined eligible for the National Register of Historic Places and was listed on the register by the Arizona State Historic Preservation Officer (SHPO) on June 21, 1995. The road is an example of Civilian Conservation Corps (CCC) work of the depression era when President Franklin Roosevelt set work relief programs into motion to bring the country out of the Great Depression.

The East Montezuma Canyon Road was built by the Ash Mountain and Sunnyside CCC camps as a rural development project to shorten the distance between ranches in the area. A two-mile stretch of road at the top of Montezuma Pass is unpaved, giving the road a high degree of integrity. Culvert headwalls and other stretches of stone work are intact and illustrate the craftsmanship typical of CCC construction throughout the country. The CCC was quite active in Cochise County, but little is left to show for their labor. The road predates the establishment of Coronado National Memorial. The road

is therefore unusual in Arizona in that it is a CCC-built structure within a national park unit but was not built specifically for that park. West of the memorial the road becomes Forest Road 61, and east of the memorial it is a county road leading to Bisbee. The segment within the memorial, that for which a determination is being sought, has 76 culverts. The culverts are faced with stone masonry, and some are quite elaborately engineered.

The NPS Intermountain Regional Historical Architect, states that if the project is conducted as described, and attention is paid to the road's historic character, the project should have no adverse effect on this cultural resource. An Assessment of Effect Form has been sent to the Arizona State Historic Preservation Officer for concurrence with the NPS findings of No Adverse Effect to a Cultural Resource. A few culverts would need to be removed as proposed in the preferred alternative to facilitate the construction of several low water crossings. These culverts are at the proposed low water crossing locations, two culverts will remain in place but will be non-functional, a third culvert is proposed for removal is damaged and non-functional. None of the culverts within the project area have a stone headwall structure with the exception of the large double culvert at the Visitor Center and no work is proposed that would impact any of the historic stone headwall structures along the roadway. Therefore, the topic of historic structures has been dismissed from further analysis. No adverse effect or unacceptable impacts would occur to historic structures; the proposed actions are consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Archeological Resources

Cultural resources include archeological resources, ethnographic resources, historic structures, and cultural landscapes. Section 106 of the National Historic Preservation Act, as amended in 1992 (16 USC 470 *et seq.*); the National Park Service's Director's Order 28 *Cultural Resource Management Guideline*; and National Park Service 2006 *Management Policies* (NPS 2006) require the consideration of impacts on historic properties that are listed on or eligible to be listed in the National Register of Historic Places. The National Register is the nation's inventory of historic places and the national repository of documentation on property types and their significance. The above-mentioned policies and regulations require federal agencies to coordinate consultation with State Historic Preservation Officers regarding the potential effects to properties listed on or eligible for the National Register of Historic Places.

The Western Archeological and Conservation Center surveyed the memorial (WACC, 1975) for archeological resources during March and April 1975. No archeological resources within the project area were identified; therefore, this topic was dismissed from further consideration. The road shoulder is frequently and highly disturbed by road maintenance and Montezuma Wash has been significantly altered by extreme and frequent flooding.

In accordance with the Arizona State Historic Preservation Office's SHPO Position on Relying on Old Archaeological Survey Data (April 2004), archeologists at the Western

Archeological and Conservation Center have reviewed the documentation for the archeological survey project, WACC project numbers CORO 1975 A and CORO 1987 A. They have taken into consideration new archeological and geomorphological knowledge of the project area and assert that this survey project meets contemporary archeological survey standards, as well as those of the Arizona SHPO and National Park Service.

Although there is no surface evidence of archeological resources, clearance to proceed is recommended with the condition that if concealed archeological resources are encountered during project activities, all necessary steps will be taken to protect them and to notify the Park Consulting Archeologist immediately.

Further, there would be no unacceptable impacts to archeological resources; the proposed actions are consistent with §1.4.7.1 of NPS *Management Policies* 2006. Should previously unknown cultural resources be encountered during construction activities, work would be halted in the discovery area and the memorial would consult according to 36 CFR 800.13 and, as appropriate, provisions of the Native American Graves Protection and Repatriation Act of 1990.

Museum Collections

According to Director's Order-24 *Museum Collections*, the National Park Service requires the consideration of impacts on museum collections (historic artifacts, natural specimens, and archival and manuscript material), and provides further policy guidance, standards, and requirements for preserving, protecting, documenting, and providing access to, and use of, National Park Service museum collections. The proposed action would not have an impact on museum collections which are currently housed at Western Archeological Conservation Center.

Further, this action would not result in any unacceptable impacts; the proposed actions are consistent with §1.4.7.1 of NPS *Management Policies* 2006. Because these effects would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

Cultural Landscapes

According to the National Park Service's Director's Order-28 *Cultural Resource Management Guideline*, a cultural landscape is a reflection of human adaptation and use of natural resources, and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. At Coronado National Memorial cultural landscapes are important in carrying out the memorial's purpose, particularly as related to preserving the views of Mexico and the United States, which provide the setting for contemplating Francisco Vásquez de Coronado's expedition.

There are no designated cultural landscapes at the memorial, however inventories are proposed for abandoned mines and the entire memorial viewshed (NPS 2004). Since no official cultural landscapes exist at Coronado National Memorial no unacceptable

impacts would occur to cultural landscape resources; the proposed actions are consistent with §1.4.7.1 of NPS *Management Policies* 2006. This topic is dismissed from further analysis in this document.

Ethnographic Resources

The National Park Service's Director's Order 28 *Cultural Resource Management*, ethnographic resources are defined as any site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it. According to DO-28 and Executive Order 13007 on sacred sites, the National Park Service should try to preserve and protect ethnographic resources.

In consultation with Native American tribes, ethnographic resources are not known to exist in the proposed project area. Native American tribes traditionally associated the monument were apprised of the proposed project during scoping. One response confirmed their cultural affiliations with the area, but indicated that no impacts to significant ethnographic resources are expected. Further, such negligible impacts would not result in any unacceptable impacts; the proposed actions are consistent with §1.4.7.1 of NPS *Management Policies* 2006. Because these effects are minor or less in degree and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

Paleontological Resources

According to 2006 *Management Policies*, paleontological resources (fossils), including both organic and mineralized remains in body or trace form, would be protected, preserved, and managed for public education, interpretation, and scientific research (NPS 2006). There are several geologic formations at the memorial that may contain fossils, however, surveys have not been completed and no fossil resources have been recorded. Since the project area is highly disturbed and no paleontological resources have been identified in the memorial. Therefore, there are no to negligible impacts to paleontological resources as a result of this proposal and they will be dismissed from further assessment. If concealed paleontological resources are encountered during project activities, all necessary steps will be taken to protect them and to notify the Park Consulting Archeologist immediately. Further, such negligible impacts would not result in any unacceptable impacts; the proposed actions are consistent with §1.4.7.1 of NPS *Management Policies* 2006. Because these effects are minor or less in degree and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

Wildlife

According to the National Park Service's 2006 *Management Policies*, the National Park Service strives to maintain all components and processes of naturally evolving park unit ecosystems, including the natural abundance, diversity, and ecological integrity of animals (NPS 2006). Wildlife commonly found in the memorial includes: coyotes, cougar, black bear, cottontail rabbits, bats, mice, and numerous species of birds and

reptiles (Cockrum, et. a. 1979; Swann et. a. 2000; Petryszn and Alberti n.d.; plus unpublished memorial observations). The project area is disturbed by humans and wildlife have adapted to the presence of the roadway and Coronado Cave Trail.

The location of the proposed project would be in a disturbed area along the road shoulder. The presence of humans and vehicular traffic have removed or displaced some native wildlife habitat in the project area. Some smaller wildlife species such as rodents, reptiles, and their habitat may be displaced or eliminated during construction of the ditches, culverts, hardening some pull offs and low water crossings. Disturbed areas would be re-vegetated and rehabilitated following construction which would result in a negligible impact to the wildlife and wildlife habitat in the immediate area of road construction.

The proposed rehabilitation of the channel in the section of Montezuma Wash within the project area has been highly disturbed by two major flooding events (2006 and 2008). Major debris flows have changed the channel morphology and ground dwelling wildlife habitat could have changed significantly. Within the wash the natural cycle is one of disturbance. Disturbed areas would be rehabilitated following construction, which would result in a negligible to minor adverse impact to wildlife and wildlife habitat within the immediate vicinity of the reconstruction. Although impacts on wildlife would be detectable due to displacement and habitat removal they would be localized and temporary. Effects on individuals of a given species within the project area would not have an adverse impact to overall memorial-wide populations.

During construction, noise would also increase which may temporarily disturb wildlife in the general area. Construction-related noise would be temporary, and existing sound conditions would resume following construction activities. Sound conditions along the road shoulder and within the project area of the wash are predominantly disturbed by traffic noise and hikers using the Coronado Cave Trail. Construction within the road corridor and wash, are considered minor or negligible impacts and would not result in any unacceptable impacts; the proposed actions are consistent with §1.4.7.1 of NPS *Management Policies* 2006. Because the effects to wildlife and wildlife habitat from the proposed project are minor or less in degree, this topic has been dismissed from further analysis in this document.

Special Status Species

The Endangered Species Act of 1973 requires examination of impacts on all federally-listed threatened, endangered, and candidate species. Section 7 of the Endangered Species Act requires all federal agencies to consult with the U.S. Fish and Wildlife Service (or designated representative) to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitats. In addition, the 2006 *Management Policies* and Director's Order 77 *Natural Resources Management Guidelines* require the National Park Service to examine the impacts on federal candidate species, as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species (NPS 2006). For the

purposes of this analysis, the U.S. Fish and Wildlife Service (USFWS) and the Arizona Game and Fish Department were contacted during the scoping for this project.

The memorial is home to two species listed as threatened and endangered by the USFWS, they are the Mexican spotted owl (*Strix occidentalis lucida*) and the lesser longed-nosed bat (*Leptonycteris curasoae yerbabuenae*). The Mexican spotted owl has a designated protected activity center (PAC) at the memorial where disturbance should not occur during the breeding season from the beginning of March to late August. The northern most boundary of the proposed project area would be the Warren Crossing and the southern boundary of the PAC is that area. The proposed project would be completed in the Warren area first (estimated to be December, 2009) and no work would be allowed within the PAC from the beginning of March to early June. The lesser longed-nosed bat is a migrant and would not be in the project area when work is proposed to occur. The NPS contacted USFWS and concurred that there would be no effect to the Mexican spotted owl and the lesser long-nosed bat.

The yellow-billed cuckoo (*Coccyzus americanus*) is a species of concern in Arizona a single bird was been seen in the proposed project area one time in 2007. The habitat within the project area is considered marginal habitat by NPS biologists and because the species has only been seen once it is highly unlikely that it is resident within the project area. The area where the cuckoo was last seen would be surveyed prior to the proposed project. If cuckoos are located in the project area and are nesting the trees in that location will remain undisturbed throughout the project. The proposed project would be scheduled to occur in months when the cuckoo is not present in southern Arizona. Due to the lack of suitable habitat the NPS has determined there would be no adverse effect to yellow-billed cuckoo from this project as proposed.

There have been six botanical surveys completed at the memorial. Two species of concern the Huachuca Mountain milkvetch and netted globeberry have been documented at the memorial (Ruffner and Johnson 1991) but have not been found within the project area. A contracted botanist will survey the project area during the growing season to determine if there are any species of concern that have not been identified in previous surveys. If a plant is found along the road shoulder, in proposed parking areas or within the wash the following mitigation actions would occur:

- Contract provisions would require the cessation of construction activities, if a species of concern were discovered in the project area, while Memorial staff re-evaluates the project. This would allow modification of the contract for any protection measures determined necessary to protect the species and its habitat. In consultation with USFWS or AZGF the NPS would take measures to protect any sensitive species, whether they were identified through surveys or presumed to be present.

NPS biologists and a local botanist agree that the habitat is likely not suitable for state or federally listed threatened or endangered plant species. The project area has been highly disturbed and the wash has aggraded significantly through recent flooding

events. Due to a lack of suitable habitat in the vicinity of the project area there would be no effect on special status species. A no effect determination memo for the proposed project was sent to USFWS for concurrence. Further, such negligible impacts would not result in any unacceptable impacts; the proposed actions are consistent with §1.4.7.1 of NPS *Management Policies* 2006. Therefore, the topic of threatened and endangered species was dismissed from further analysis. Mitigation measures that would be taken if a species is found to occur in the project area can be found in the mitigation section of this document.

Water Resources

National Park Service policies require protection of water quality consistent with the Clean Water Act. The purpose of the Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters". To accomplish this goal, the U.S. Army Corps of Engineers has been charged with evaluating federal actions that result in potential degradation of waters of the United States and issuing permits for actions consistent with the Clean Water Act. The U.S. Environmental Protection Agency also has responsibility for oversight and review of permits and actions which affect waters of the United States.

The proposed project area contains limited and sporadic surface water. The majority of this running water occurs only during monsoon season from approximately summer through fall. The wash within the project area is dry for the majority of the year. Water quality, water quantity, and drinking water are not expected to be affected by the project. An increase in sedimentation would be expected with both proposed action and non-action alternatives within the wash due to the instability caused by the debris flows that were created in the 2006 flood. The proposed channel repair would involve moving sediment from past flood events. The sediment load is currently extreme and it is doubtful that the project would add an appreciable amount of sediment. All disturbed areas would be revegetated and recontoured following channel repairs within the wash.

Although the potential for sedimentation exists along the roadway sediment controls would be implemented consistent with traditional best management practices and NPS design standards. The asphalt pavement within the project area is currently broken, fragmented and eroding. Resurfacing thus constructing a solid less erodible surface may reduce the dispersal of asphalt by-products into the water resources. The improvements to pull-offs would improve water quality in localized areas and reduce soil disturbance, loss of vegetation and reduce volume and intensity of surface runoff. This action would have a long term beneficial impact to water quality.

Some ground water would be pumped to be used as dust abatement measures during the project. The amount of water estimated to be needed for the project and for a typical year at the Memorial is below 25% of the NPS water right from the San Pedro Basin aquifer. During consultation with NPS Water Resource Division it was determined that the effects of the project on water quality should be short term and negligible. Such negligible impacts would not result in any unacceptable impacts; the

proposed actions are consistent with §1.4.7.1 of NPS *Management Policies* 2006. Because the project results in negligible effects to water resources, this topic has been dismissed from further consideration.

Floodplains

Executive Order 11988 *Floodplain Management* requires all federal agencies to avoid construction within a floodplain unless no other practicable alternative exists. The National Park Service under 2006 *Management Policies* and Director's Order 77-2 *Floodplain Management* would strive to preserve floodplain values and minimize hazardous floodplain conditions. According to Director's Order 77-2 *Floodplain Management*, certain construction within a 100-year floodplain requires preparation of a Statement of Findings for floodplains. This procedural manual applies to all NPS proposed actions, including the direct and indirect support of floodplain development and channel modifications that could adversely affect the natural resources and functions of floodplains or increase flood risks.

The proposed project includes restoration work within Montezuma Wash and several low water crossings are proposed across tributaries to the main channel. Since the project activities would occur inside the Ordinary High Water Mark Section 404 permit of the Clean Water Act would be required from the U.S. Army Corps of Engineers. In addition a state issued CWA 401 water quality certification would be obtained from the Arizona Department of Environmental Quality before proposed work would begin.

Montezuma Wash conveys water in most years for 4-5 months usually July through November. The floodplain is well developed and clearly confined by steep terrain on either side. A jurisdictional high water mark has been determined for the channel. The restoration effort within the wash would focus on returning the channel to the pre-flood 2008 condition. The historic road and culverts within the project area are located within a 100-year floodplain. A statement of findings for floodplains would not be prepared for the proposed project since the structures (the road and culverts) currently exist in the floodplain and no new structures/facilities would be added. Also one of the goals of the project is to return the channel to a natural functioning condition prior to the 2008 flood. The proposed actions are consistent with §1.4.7.1 of NPS *Management Policies* 2006. Further, there would be no unacceptable impacts to the floodplain of Montezuma Wash within the project area. In consultation with the NPS Water Resource Division the project is expected to have a long term, beneficial effect on the floodplain by returning it to a functional condition and have a short term negligible to minor adverse impact during construction.

Wetlands

Executive Order 11990 *Protection of Wetlands* requires federal agencies to avoid, where possible, adverse impacts on wetlands. NPS policies and procedures for implementing E.O. 11990, found in NPS *Management Policies* (2006) and NPS *Procedural Manual 77-1: Wetlands Protection*, strive to prevent the loss or degradation

of wetlands and to preserve and enhance their natural and beneficial values. In accordance with these policies and procedures, proposed actions that have the potential to adversely impact wetlands must be addressed in a Wetland Statement of Findings, which is attached to the NEPA document.

Aquatic resources in NPS units are also subject to regulation under Section 404 of the Clean Water Act. This Act authorizes the U.S. Army Corps of Engineers to regulate, through a permitting process, discharge of dredged or fill material within “waters of the United States,” including rivers, streams, and many types of wetlands.

Any area that is defined as a *wetland* according to the U.S. Fish and Wildlife Service's "Classification of Wetlands and Deepwater Habitats of the United States" (Cowardin et al. 1979) is subject to NPS wetland protection procedures. Under this definition, a wetland must have one or more of the following three attributes:

1. at least periodically, the land supports predominantly hydrophytes (wetland vegetation);
2. the substrate is predominantly undrained hydric soil; or
3. the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year.

Therefore, unvegetated stream channels such as Montezuma Wash or its tributaries are considered wetlands under NPS procedures if they meet criterion #3.

Under the Clean Water Act, wetlands are defined somewhat more narrowly, and include only those sites that exhibit all three of the above characteristics (e.g., vegetated wetlands such as marshes, bogs, wet meadows or swamps). However, Montezuma Wash and its tributaries are considered other “waters of the United States,” and are still regulated under the Act.

The proposed restoration of the natural channel form and gradient is constrained by the presence of the culverts located near the visitor center and the current sediment and debris load in the channel and tributaries of Montezuma Wash. The goal is to restore the channel to the extent practicable given the constraints of the culverts and the extreme sediment load. The goal of the proposed projects at the low water crossings is to restore and maintain the conveyance of water, sediment and debris. The low water crossings would improve the channel processes of transporting water and sediment in comparison to the undersized and poorly located culverts.

This project proposes excavation and fill placement (channel re-shaping) in wetlands as defined under NPS wetland procedures (Procedural Manual #77-1). However, the proposed actions have been determined by NPS staff to be “excepted actions” under Section 4.2.1.h (restoration) of those procedures. Therefore, a Wetland Statement of Findings would not be prepared, and the impact topic of wetlands has been dismissed. Further in consultation with the NPS Water Resource Division it was concluded that

there would be no unacceptable impacts to wetlands; the proposed actions are consistent with §1.4.7.1 of *NPS Management Policies* 2006.

Air Quality

The Clean Air Act of 1963 (42 U.S.C. 7401 *et seq.*) was established to promote the public health and welfare by protecting and enhancing the nation's air quality. The act establishes specific programs that provide special protection for air resources and air quality related values associated with National Park Service units. Section 118 of the Clean Air Act requires a park unit to meet all federal, state, and local air pollution standards. Coronado National Memorial is designated as a Class II air quality area under the Clean Air Act. A Class II designation indicates the maximum allowable increase in concentrations of pollutants over baseline concentrations of sulfur dioxide and particulate matter as specified in Section 163 of the Clean Air Act. Further, the Clean Air Act provides that the federal land manager has an affirmative responsibility to protect air quality related values (including visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse pollution impacts (EPA 2000).

Construction activities such as hauling materials and operating heavy equipment could result in temporary increases in vehicle exhaust, emissions, and fugitive dust within the proposed project area. Construction activities as proposed in the preferred alternative would have short-term minor adverse impacts to air quality. Dust abatement efforts would be implemented to control fugitive dust emissions during construction and impacts would be localized. Any exhaust, emissions, and fugitive dust generated from construction activities would be temporary and localized, and would likely dissipate rapidly. Overall, the project could result in a negligible degradation of local air quality, and such effects would be temporary, lasting only as long as construction. Further, because the memorial's Class II air quality would not be affected long term, the proposed actions are consistent with §1.4.7.1 of *NPS Management Policies* 2006. This topic is dismissed from further analysis in this document.

Soundscape Management

In accordance with *2006 Management Policies* and Director's Order 47 *Sound Preservation and Noise Management*, an important component of the National Park Service's mission is the preservation of natural soundscapes associated with national park units (*NPS* 2006). Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials. The frequencies, magnitudes, and durations of human-caused sound considered acceptable varies among National Park Service units as well as potentially throughout each park unit, being generally greater in developed areas and less in undeveloped areas.

Existing sounds in this area are most often generated from vehicular traffic, people hiking Coronado Cave Trail, wildlife sounds such as birds, wind and running water during the monsoon season. Proposed construction activities necessary in the preferred alternative would cause impacts to the natural soundscape. Due to the law enforcement issues related to the international border and smuggling activities, raised pavement markers may be added at the approaches to the proposed low water crossing. The proposed low water crossings would be signed at 15 mph to slow vehicular traffic. The dips in the low water crossings are necessary to adequately move water and sediment across the pavement to the main channel of Montezuma Wash. The raised pavement markers would create additional noise, but the related noise would be localized and negligible and not generally discernable to visitors. There currently are raised pavement markers in front of the Visitor center to alert drivers to a pedestrian crossing.

However, these impacts would be limited in scope, short-term, and negligible. In the long-term, noise from motor vehicle and visitors using the memorial would continue. Therefore, the topic of soundscape management has been dismissed as an impact topic. Further, such negligible or minor impacts would not result in any unacceptable impacts; the proposed actions are consistent with §1.4.7.1 of *NPS Management Policies* 2006. Because these effects are minor or less in degree and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

Lightscape Management

In accordance with *2006 Management Policies*, the National Park Service strives to preserve natural ambient landscapes, which are natural resources and values that exist in the absence of human caused light (*NPS 2006*). Coronado National Memorial strives to limit the use of artificial outdoor lighting to that which is necessary for basic safety requirements. There would be no artificial lighting needed during construction nor is any planned to be included in the proposed project. No additional impacts to the lightscape would result from this project; the proposed actions are consistent with §1.4.7.1 of *NPS Management Policies* 2006. This topic is dismissed from further analysis in this document.

Socioeconomics

The proposed action would neither change local and regional land use nor appreciably impact local business or other agencies. Visitation at Coronado has remained relatively stable during 1997 to 2005, fluctuating slightly. The Memorial experienced a decline in visitation in 2006 due to a 500-year flood that closed the East Montezuma Canyon Road during the summer months. The average visitation over the last 10 years, from 1997 to 2006 is 86,348.

Implementation of the proposed action could provide a negligible beneficial impact to the economies of nearby Palominos, Arizona, minimal increases in employment opportunities for the construction workforce and revenues for local businesses and governments generated from these additional construction activities and workers. Any

increase in workforce and revenue, however, would be temporary, lasting only as long as construction. Because the impacts to the socioeconomic environment would be short term this topic has been dismissed.

Prime and Unique Farmlands

The Farmland Protection Policy Act of 1981, as amended, requires federal agencies to consider adverse effects to prime and unique farmlands that would result in the conversion of these lands to non-agricultural uses. Prime or unique farmland is classified by the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), and is defined as soil that particularly produces general crops such as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables, and nuts. There are no prime or unique farmlands in the project area (NPS, 2004). Therefore, the topic of prime and unique farmlands has been dismissed.

Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by the Department of Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes.

There are no Indian trust resources at Coronado National Memorial (NPS, 2004). The lands comprising the Memorial are not held in trust by the Secretary of the Interior for the benefit of Indians. Therefore, the project would have no effects on Indian trust resources, and this topic was dismissed as an impact topic.

Environmental Justice

Executive Order 12898 *General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. Because the new operations and utility facility would be available for use by all Memorial staff regardless of race or income, and the construction workforces would not be hired based on their race or income, the proposed action would not have disproportionate health or environmental effects on minorities or low-income populations or communities. Therefore, environmental justice has been dismissed as an impact topic in this document.

Wilderness

In accordance with NPS Management Policies, areas of potential wilderness are managed as if they were designated wilderness, and efforts are made to eliminate those conditions that preclude wilderness designation. No potential or designated wilderness areas exist within Coronado National Memorial; therefore wilderness has been dismissed as an impact topic.

ALTERNATIVES CONSIDERED

An interdisciplinary team of National Park Service employees and subject matter experts have met numerous times (approximately seven times to date) for the purpose of developing project objectives and alternatives. These meetings have resulted in the definition of project objectives as described in the *Purpose and Need* and a list of alternatives that could potentially meet these objectives.

A total of four action alternatives and the no-action alternative were originally identified for this project. Of these, two of the action alternatives were dismissed from further consideration for various reasons, as described later in this chapter. One action alternative and the no-action alternative are carried forward for further evaluation in this environmental assessment. A summary table comparing alternative components is presented at the end of this chapter.

Alternatives Carried Forward

Alternative A – No Action

Evaluation of a No Action Alternative is required by the National Environmental Policy Act (NEPA) and allows for analysis of the environmental consequences related to management of ongoing conditions that affect visitor experience, resource protection and park operations. The No Action Alternative provides a baseline against which to compare the proposed alternative.

Under Alternative A, the no action alternation, no road rehabilitation would occur except for emergency needs. Emergency repairs made to date would allow the road to remain open until future flood events occur. Stream bank erosion along Montezuma Wash would continue to occur throughout the monsoon season. The continued erosion of the stream bank would put the historic structures of the roadway alignment and culverts in jeopardy of collapse and failure. Washed out or plugged culverts would continue to be cleaned but would not be replaced. Maintenance activities to culverts would continue to be time consuming and frequent due to the large amount of sediment moving through the system. Water and sediment from storm events would continue to be funneled toward inadequate culverts, thus causing frequent road closures. Changes in the geology of the watershed post 2006 and 2008 flood events has resulted in the formation of new debris slide and side channels within Montezuma Canyon. The original drainage system designed with the road in the 1930's is currently inadequate.

The instability of the aggraded Montezuma Wash would continue for decades. Stable stream morphology is based upon the equilibrium between sediment supply and carrying capacity of the stream (NCD, 2009). Due to the changes in the geology of the area the culverts are now inadequately sized and no longer placed where drainages are located. Sediment and water would continue to flow over the roadway.

This alternative could lead to increased and lengthy road closures and possibly the complete failure of the road. Road closures at the memorial could lead to safety and law enforcement issues related to the ever present need to maintain national security along our shared border with Mexico. The Border Patrol and Park Rangers would continue to need access to the international border and Montezuma Pass for emergency response needs. Tourists, hunters, local ranchers and Forest Service personnel would be negatively affected by prolonged road closures. The closest alternate route to access areas west of the memorial either pass through the military installation of Fort Huachuca or further north to the town of Whetstone, AZ, both routes add approximately 100 miles to the trip.

The Coronado Cave trail would remain in Montezuma Wash and annual repairs would be anticipated. No new parking lot or trailhead would be constructed. The informal pull offs created by law enforcement and visitors would continue and would be anticipated to increase in size. The disturbance and damage to roadside soils, vegetation would continue. Under Alternative A, removal and rehabilitation of unofficial pull offs would proceed on a case by case basis becoming a part of normal maintenance contingent upon funding availability and priorities.

Alternative B – Flood Mitigation Road Repairs at Montezuma Wash

The proposed actions described below collectively comprise Alternative B the “action alternative” analyzed within this document. After extensive planning efforts and public involvement, it was determined that the purpose and need for action could be accomplished through the proposed Alternative B.

Alternative B would contribute to protecting the historic structure of the roadway at the memorial as well as improve the existing pavement, create a drainage system that fits the current geomorphology and would formalize roadside pull offs. The existing four inches of asphalt would be pulverized and overlain with three inches of new asphalt pavement. Approximately three concrete low water crossings would be installed to provide transportation of water and sediment over the roadway during larger storm events and through a channel in the crossing for low flow events. These crossings would be located at contributing washes some of them newly created in recent storm events. This project would address the ongoing maintenance concerns of Coronado Cave Trail by moving the trailhead and trail located within Montezuma Wash out of the channel. The project proposes to accelerate the restoration process (within the project area) of Montezuma Wash permitting it to function more naturally. Staging areas for the proposed project would be located in previously disturbed areas. The main staging area would be located in the Montezuma Ranch area which has recently been used as

a staging area for international border fence construction. Another staging area will be adjacent to the roadway within the project area and has historically been used as a location to store road materials.

Restoration of Pavement of Historic East Montezuma Canyon Road

The proposed actions would include re-surfacing, restoring and rehabilitation of 3.5 miles of deteriorating pavement on East Montezuma Canyon Road. The road, constructed between 1933 and 1935 by the Civilian Conservation Corps, has been determined eligible for listing on the National Register of Historic Places. The resurfacing work would only occur on sections of road that are currently paved, no additional paving of the dirt section of the road is proposed. The paved areas that would be included in the project area are the main road from the entrance to the memorial, continuing 3.5 miles to the west, the visitor center parking lot, the access road to the picnic area and its associated parking areas. The project would replace the entire asphalt pavement that has reached the end of its lifespan. Base material would be added along the road shoulder where needed to provide an adequate slope and shoulder.

Install Drainage Structures to Protect the Historic Roadway

Extreme flooding in recent years has altered the channel of Montezuma Wash and it is currently threatening the stability of the road. Effective road drainage is dependent on a relatively stable channel morphology given the close proximity of the stream and road through much of the canyon. Given the amount of sediment in the stream channel and the close proximity of the road, maintenance would be high for the foreseeable future but a more stable channel alignment would help ensure that future road damage and maintenance issues are minimized. Alternative B provides a plan for a more sustainable drainage system by building low water crossings where debris flows have formed new channels along the roadway and improving the functioning of two crossings currently in place.

The proposed low water crossings would replace a few (2-3 culverts) existing inadequately sized metal buried culverts (without stone headwalls). The low water crossings would include a grated drainage channel placed in the center of the crossing. This channel is designed to move lower water flows through the crossing without flowing on the surface. The grates would be designed to be removed and cleaned with motorized bucket equipment. The low water crossing would be maintained by the park through an approved plan after major storm events. The crossings would be graded to match the topography of the area, leading the water to flow across to the main channel. Debris would accumulate on the roadway but would be easier to clear than accessing and removing debris from inadequately sized culverts. The low water crossings would be more sustainable for the maintenance staff and could result in shorter road closures after storm events. Two low water crossings currently in place would be contoured to better move water and sediment downstream. Currently the sediment load at these locations is preventing adequate drainage.

Formalize Emergency and Visitor Pull off Locations

Under Alternative B many of the existing informal pull off areas would be removed. Approximately eight of the existing pull offs used primarily by law enforcement, and occasionally by visitors and staff (see Figure 6 below) would be hardened and formalized and approximately nine would be removed and revegetated. The pull offs have been formed in locations where law enforcement have needed access and parking



Figure 6. Before picture showing informal pull offs and lower picture showing a formalized pull off.

to pursue and apprehend undocumented illegal aliens (UDA), human or drug smugglers. Of course emergency situations would continue to occur and future pull offs may develop. The management at Coronado National Memorial would coordinate with local law enforcement agencies to advise them of our efforts to close some pull offs and harden others. Key to the success of this proposal would be gaining cooperation from other law enforcement agencies.

Physical barriers, extruded concrete curbing, and in some cases ditching, placement of large boulders; treatments would vary per location depending on existing conditions. Pull offs that have been slated for removal would be environmentally rehabilitated through various treatments. A Revegetation Plan would be developed to address the specific needs at each site. Overall, factoring in the areas to be formalized and the areas to be rehabilitated it is nearly an even exchange.

Remove Coronado Cave Trailhead and Trail from Montezuma Wash

The Coronado Cave Trail is currently located within the channel of Montezuma Wash for approximately 1/4 of a mile, before it turns north toward the cave. Due to the extreme flooding events experienced in the past few years maintaining this portion of the trail has increased in cost and has been a repetitive maintenance issue. The trail has been rebuilt two times in three years at a cost of approximately \$50,000.00. Adding a parking lot and moving the trailhead further west along East Montezuma Canyon Road would remove the trail from the wash but shorten the length of the trail. Financially there would be an additional expense of constructing, paving and maintaining a new parking lot. The construction costs are estimated to be approximately \$10,000.00. There could be a potential long term financial savings to the NPS by moving the trail out of the wash.

Repair Montezuma Wash Channel Stability

Extreme flooding in recent years has altered the channel of Montezuma Wash and it is currently threatening the stability of the road. Extreme monsoon rain storms lead to flooding in 2006 and 2008 that caused extensive channel realignment in Montezuma Wash. The main channel within the wash is close to the road and in a number of areas is impacting the stability of the roadway. Flood debris (rock, gravel and woody material) has plugged historic culverts and caused severe erosion of the road embankments and roadside ditches. These debris jams have realigned the channel redirecting water flow toward the roadway causing severe erosion of the embankments in a number of locations. The restoration project being proposed would return Montezuma Wash to a more naturally functioning stream channel (NCD, 2009). The project would return the main flows back to the side of the channel as it was prior to the 2008 flood. There are two low water crossings upstream of the paved roads that have been in place for a number of years. These crossings would be improved to better facilitate the movement of sediment and water across the road. The overall goal of the project is to improve the long term sustainability of the channel and protect the roadway.

The continued presence of the historic culverts near the visitor center crossing would continue to encourage sediment to be deposited upstream of the culverts during some flood events. Additionally, the reach of the channel downstream of the culvert would continue to be starved of sediment input and would likely continue to erode, potentially threatening the crossing with undercutting. The restoration of the channel should be viewed as a short-term fix to the sediment collection problem. Depending on the magnitude of future events and more importantly, the influx of sediment, the restored channel may provide an efficient conveyance for years or decades to come. The area downstream of the historic culverts near the visitor center is in need of some maintenance to prevent the roadway from collapsing from erosion that has developed beneath the culverts. Large boulders or a cement apron may be placed below the culverts to slow the velocity of the water and the erosion that is weakening the road.

The restored channel needs to be able to pass sediment downstream. There is a very large amount of sediment that has accumulated and aggraded the stream channel. The sediment has realigned the channel and has impaired the channels ability to carry water and debris along a major portion of Montezuma Wash. Installation of riprap is proposed at locations within the wash includes areas both above and below the historic culverts. This large riprap is intended to absorb the energy of the water and reduce erosion. Channel restoration in Montezuma Wash is intended to recreate the flow of water and return the channel to pre-flood conditions of 2008.

While constructing the proposed low water crossings, and clearing the two installed upper low water crossings, armoring the stream bank with rip rap and restoring the aggregated Montezuma wash channel approximately 30 trees may be cut. Equipment and material storage and other staging activities would be located within the footprint of the existing road, pullouts and other previously disturbed areas. Because the channel restoration is a short term solution and temporary fix to the channel sedimentation problems due to the location within the stream channel of the historic culverts future maintenance in the channel would be necessary. The maintenance of the channel to keep it open and conveying water and sediment would continue long term until another solution is found to address the issues.

The conceptual design for road improvements and repairs to the river channel presented in this document may be modified during final design to best accommodate site specific conditions and minimize resource impacts.

Mitigation Measures

Proposed mitigation measures and best management practices are described below for Alternative B. These measures would be implemented to reduce potential effects to natural resources, cultural resources, visitor use and experience, and other elements.

General Measures

- Best management practices (BMP) would be used for all phases of construction activity, including pre-construction, actual construction, and post-construction.

BMP for storm water management and sediment control measures in desert areas that apply specifically to construction sites would be implemented, and appropriate erosion and sediment control measures would be in place at all times.

- A pre-construction meeting would be held to inform construction contractors about sensitive areas including natural and cultural resource concerns of the park.
- The contractors would maintain strict garbage control to prevent scavengers from being attracted to the staging or project areas. No food scraps would be discarded or fed to wildlife.
- To minimize the amount of ground disturbance, staging and stockpiling areas would be located in previously disturbed sites, away from visitor use areas to the extent possible. All staging and stockpiling areas would be returned to pre-construction conditions following construction.
- Construction zones would be identified and fenced with construction fence, snow fencing, or some similar material prior to any construction activity. The fencing would define the construction zone and confine activity to the minimum area required for construction. All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone as defined by the construction zone fencing.
- Ground disturbance and site management would be carefully controlled to prevent undue damage to vegetation and soils and to minimize air, water, soil, and noise pollution.
- A hazardous spill plan would be submitted, stating actions that would be taken in case of a spill. This plan would address the storage and handling of hazardous materials, and notification procedures for a spill.

Natural Resources

- A revegetation plan would be developed to rehabilitate disturbed areas. Appropriate methods of rehabilitation and treatment of disturbed areas would be evaluated on a case-by-case basis. The proposed repair work in the Montezuma Wash would be developed in a site specific plan.
- Salvaged topsoil, as well as incidental native vegetation (as feasible); from the construction areas would be kept for reuse during rehabilitation of disturbed areas.
- Revegetation and recontouring of disturbed areas would take place following construction, and would be designed to minimize the visual intrusion of the structure and enhance native species composition. Revegetation efforts would use native species and materials. All disturbed areas would be rehabilitated to reduce soil exposure. Weed control methods would be implemented to minimize the introduction of noxious weeds.
- Because disturbed soils are susceptible to erosion until revegetation takes place, standard erosion control measures such as silt fences and/or sand bags would be used to minimize any potential soil erosion.

- Undesirable plant species would be monitored and controlled, as necessary. To prevent the introduction of, and minimize the spread of non-native vegetation and noxious weeds limit equipment parking to within the construction limits, obtain all, rock or additional topsoil from a local weed free source.
- Fugitive dust generated by construction would be controlled by spraying water on the construction site.
- To reduce noise and emissions, construction equipment would not be permitted to idle for long periods of time.
- To minimize possible petrochemical leaks from construction equipment, the contractor would regularly monitor and check construction equipment to identify and repair any leaks.
- Construction workers and supervisors would be informed about special status species. Contract provisions would require the cessation of construction activities if a species were discovered in the project area, until Memorial staff re-evaluates the project. This would allow modification of the contract for any protection measures determined necessary to protect the discovery.
- Before and during construction, the NPS or contracted biologist would conduct additional surveys for rare and special status species before taking any action that might cause harm. If found, consultation with USFWS would occur the NPS would take measures to protect any sensitive species, whether they were identified through surveys or presumed to be present. Construction would be scheduled during the calendar year to avoid impacting special status species.
- To avoid adverse impacts to potential Mexican spotted owls at the memorial, any noise-producing construction activities above ambient noise levels would not be permitted from March 1 to August 31. Work in the designated PAC would occur as early as possible in the year and would occur outside of the prime breeding season for the owl.
- Contract provisions would require the cessation of construction activities, if a species of concern were discovered in the project area, while Memorial staff re-evaluates the project. This would allow modification of the contract for any protection measures determined necessary to protect the species and its habitat. In consultation with USFWS or AZGF the NPS would take measures to protect any sensitive species, whether they were identified through surveys or presumed to be present.

Cultural Resources

- Should construction unearth previously undiscovered cultural resources, work would be stopped in the area of any discovery and the memorial would consult with the Arizona State Historic Preservation Officer and the Advisory Council on Historic Preservation, as necessary, according to §36 CFR 800.13, *Post Review Discoveries*. In the unlikely event that human remains are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (1990) would be followed.
- The National Park Service would ensure that all contractors and subcontractors are informed of the penalties for illegally collecting artifacts or intentionally damaging archeological sites or historic properties. Contractors and

subcontractors would also be instructed on procedures to follow in case previously unknown paleontological or archeological resources are uncovered during construction.

- Construction workers and supervisors would be informed about the special sensitivity of memorial's values, regulations, and appropriate housekeeping.

Visitor Experience and Use and Park Operations

- To the extent practical, work would be scheduled to avoid construction activity and construction related delays during peak visitation times. No holiday or evening work would be allowed. No weekend work would be allowed unless authorized by the superintendent.
- A public information program and local agency coordination effort would be implemented to warn of temporary closures, delays, and road hazards during construction. This program would help convey appropriate messages and aid in mitigating potential impacts on visitors and staff expectations and experiences.
- A Traffic Control Plan would be developed to address anticipated delays, safety considerations, estimated length of delays and estimated number of vehicles that would be stopped at any one point. Flaggers would be required for the proposed project. Immediate access would be provided to any emergency vehicles.

Alternatives Considered and Dismissed

During the course of planning the project goals and objectives were continually refined and these alternatives were developed during that process and later dismissed. The dismissed alternatives do not meet the project objectives or were outside of the available project funds. The following reasons for their dismissal are provided in the descriptions below.

- **Minimal Repairs** – This alternative was proposed to make very minimal repairs to the flood damaged roadway and no restoration within the channel. The minimal repair would have provided a surface treatment of the roadway only (a chip and seal project). The under sized culverts would be cleaned and put back into service until the next storm waters flowed and moved sediment into the culvert. With the amount of debris and sediment in the watershed it is believed that continued and frequent maintenance would be required to keep the road open. Numerous short term closures would be anticipated. Numerous debris flows were created in the last few flooding events many of them crossing the road. These new channel crossings at the road would have no drainage features to convey water and sediment to the main channel. Riprap could be placed along the stream bank to temporarily shore up the roadway but without channel restoration it is believed that the backwater and new channels would continue to erode the stream bank. This alternative was dismissed because it would not significantly increase the safety of the roadway for visitors and staff and it would not address the long term maintenance of the historic structure of

the roadway. Minimal repairs would not prevent the road from deteriorating further and the road could eventually fail. Long term closures may occur if erosion to the stream bank continues to occur. This alternative was dismissed because it does not provide for proper drainage structures at the new channels recently formed along the roadway, it does not stabilize the road infrastructure, it does not return the Montezuma Wash to a functioning channel, it does not protect historic structures, and it would not provide a safe roadway for visitors, staff or law enforcement agencies that need access to the area. This alternative was eliminated because it does not meet project objectives or resolve the need for action.

- **Construct a bridge** – The historic culverts at the visitor center are currently acting as a dam, preventing the movement of the sediment load further downstream. The channel at the visitor center culverts has moved and is approaching the historic culverts at an angle that is eroding the structure and the roadway. Water and sediment plugs the culverts after each rain event. The water is then forced to flow over the roadway. A bridge was and is still being considered at this location. However it is currently economically infeasible at this date. There is an urgent need to stabilize the roadway and restore the channel to a functioning condition. Memorial staff will continue to plan and to pursue funds necessary to develop a long-term solution to the problem of the wash sediment aggradations at the historic culvert. To remove historic structures requires consultation with the State Historic Preservation Officer and technical drawings, history, and photographs to produce a comprehensive, multidisciplinary record that ranges in scope with a site's level of significance and complexity. This alternative has been dismissed due to the urgency of the repairs needed to sustain the road and the technical needs required to alter a historic structure is a lengthy process. And the bridge alternative is currently economic infeasible at this point in time.

Alternative Summaries

Table 2 summarizes the major components of Alternatives A and B, and compares the ability of these alternatives to meet the project objectives (the objectives for this project are identified in the *Purpose and Need* chapter). As shown in the following table, Alternative B meets each of the objectives identified for this project, while the No Action Alternative does not address all of the objectives.

Table 2 – Alternatives Summary and Project Objectives

Alternative A – No Action	Alternative B – Flood Mitigation and Road Repairs
<p>In the no action alternative the emergency repairs made to date would allow the road to remain open but unimproved. Stream bank erosion along the roadway close to Montezuma Wash would continue to occur. The continued erosion of the stream banks could put the historic structures of the roadway in jeopardy of collapse and failure. This alternative could lead to increased and lengthy road closures and possibly the complete failure of the road. Road closures at the memorial could lead to safety and law enforcement issues related to the ever present need to maintain national security along our shared border with Mexico. The Coronado Cave trail would remain in Montezuma Wash and annual repairs would be anticipated. The informal pull offs created by law enforcement and visitors would continue to have environmental impacts through the disturbance and damage to roadside soils, vegetation. The lower channel of Montezuma Wash would remain aggraded and would continue to function poorly.</p>	<p>Alternative B would protect historic structures as well as improve the roadway through the rehabilitation of existing pavement, improve the inadequate road drainage system and would formalize roadside pull offs. Approximately three concrete low water crossings would be installed to provide for water and sediment transport to Montezuma Wash. These crossings would be located at contributing washes newly created in recent storm events. This project would address the ongoing concerns for maintenance of Coronado Cave Trail by moving the trailhead and trail out of the Montezuma Wash. The project proposes to accelerate the natural restoration process (within the project area) of Montezuma Wash. The restoration would permit the wash to function more naturally and return the channel to its pre-flood condition.</p>
Meets Project Objectives?	Meets Project Objectives?
<p>No. This Alternative does not fulfill the project objectives. Historic structures would not be protected. Safety standards for the roadway would not be met. Safety of critical law enforcement missions could be reduced. Visitor use and access may be restricted during rain events. Long term road closures could jeopardize Border Patrol mission to secure the international border. Informal pull offs would continue along the road shoulder. No new drainage structures would be constructed to address recent side channel development. And the Coronado Cave Trail would remain in the wash and require continued maintenance.</p>	<p>Yes. Alternative B fulfills the project objectives by protects historic structures against failure, meets safety standards for highways, restores Montezuma Wash channel into a functional condition, formalizes pull off parking areas, constructs a sustainable drainage system for the roadway and develops a sustainable trailhead and trail to Coronado Cave.</p>

Table 3 summarizes the anticipated environmental impacts for alternatives A and B. Only those impact topics that have been carried forward for further analysis are included in this table. The *Environmental Consequences* chapter provides a more detailed explanation of these impacts.

Table 3 – Environmental Impact Summary by Alternative

Impact Topic	Alternative A – No Action	Alternative B – Preferred Alternative
Visitor Use and Experience	Long-term moderate adverse effect to visitor who wish to experience much of the memorial and scenic views from Montezuma Pass and some trail closures. Long term closure of the road would result in impacts to visitor experience because it would be inconsistent with the memorial's purpose. This alternative could diminish opportunities for current and future generations to enjoy, learn about the Coronado and his importance in history.	Minor adverse effects resulting from delays and closures during construction. Long-term beneficial effect to visitor use from an improved road surface and more sustainable trail and trailhead to Coronado Cave. There would be not be impacts to visitor experience related to the road condition and recreational resources.
Park Operations	Moderate adverse long- term impacts to park operations related to emergency response (multiple agencies), trail maintenance and access restrictions to park staff from extended road closures. Long term road closure would result in impacts to health, safety and would unreasonably interfere with park programs.	Minor to moderate long term beneficial effects from an improved work environment that meets health and safety standards. The cumulative effects to park operations would be long-term and beneficial. There would be not be impacts to public health, safety and park operations from long term road closures.
Geology and Soils	Long term adverse effects to geology and soils would continue in the lower wash channel above the double historic culverts at the visitor center. The culverts have been in place within the channel for 75 years and have a long-term moderate adverse effect on the natural function of the channel. Because there would be no major adverse or unacceptable impacts to	Long term adverse effects to geology and soils would continue in the lower wash channel above the double historic culverts at the visitor center. The culverts have been in place within the channel for 75 years and have a long-term moderate adverse effect on the natural function of the channel. Until the historic culverts can be addressed to better function to pass the large debris flows in the area the channel would continue to need maintenance through debris removal on a regular basis. Because there would be

Impact Topic	Alternative A – No Action	Alternative B – Preferred Alternative
	geology or soils there would be no impairment of park resources or values.	no major adverse or unacceptable impacts to geology or soils there would be no impairment of park resources or values.
Vegetation	Long term negligible to minor adverse effect on road shoulder vegetation from informal pull off activity continuing. Negligible to minor adverse impact on vegetation from the continued erosion of the stream banks.	Short term negligible adverse effect to vegetation in channel and along stream banks from channel restoration. Minor beneficial effect from formalizing pull offs. Long term minor adverse effect to vegetation from continued maintenance within the stream channel to maintain flow through culverts.

Identification of the Environmentally Preferred Alternative

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which guides the Council on Environmental Quality (CEQ). The CEQ provides direction that “[t]he environmentally preferable alternative is the alternative that would promote the national environmental policy as expressed in NEPA’s Section 101:

- fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
- attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
- preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
- achieve a balance between population and resource use that would permit high standards of living and a wide sharing of life’s amenities; and
- enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

While Alternative A, No Action, would preserve existing conditions, it would not be considered the Environmental Preferred Alternative because not repairing the damaged road and improving the functioning of the Montezuma Wash channel would not meet the objectives of the NPS. The continued erosion and possible loss of the roadway would cause an adverse effect to the historical structures. Alternative A only minimally meets

the above six evaluation factors because the memorial would not be preserving important historic, cultural...aspects of our national heritage. Alternative A does not assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings.

Alternative B would protect the historic resource, restore the roadway, repair the aggraded wash and provide preferred pull offs for law enforcement and visitors. This Alternative provides sustainable protective devices such as low water crossings that would reduce the potential for road damage during high flow events. This Alternative meets the objectives identified above for preservation of the historic structures at the memorial while taking into consideration of environmental conditions. The environmentally preferred alternative best addresses these six evaluation factors.

No new information came forward from public scoping or consultation with other agencies to necessitate the development of any new alternatives, other than those described and evaluated in this document. Because it meets the Purpose and Need for the project, the project objectives, and is the environmentally preferred alternative, Alternative B is also recommended as the National Park Service Preferred Alternative. For the remainder of the document, Alternative B would be referred to as the Preferred Alternative.

ENVIRONMENTAL CONSEQUENCES

This chapter analyzes the potential environmental consequences, or impacts, that would occur as a result of implementing the proposed project. Topics analyzed in this chapter include paleontological resources, visitor use and experience, and Memorial operations. Direct, indirect, and cumulative effects, as well as impairment are analyzed for each resource topic carried forward. Potential impacts are described in terms of type, context, duration, and intensity. General definitions are defined as follows, while more specific impact thresholds are given for each resource at the beginning of each resource section.

- **Type** describes the classification of the impact as either beneficial or adverse, direct or indirect:
 - Beneficial**: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.
 - Adverse**: A change that moves the resource away from a desired condition or detracts from its appearance or condition.
 - Direct**: An effect that is caused by an action and occurs in the same time and place.
 - Indirect**: An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.

- **Context** describes the area or location in which the impact would occur. Are the effects site-specific, local, regional, or even broader?
- **Duration** describes the length of time an effect would occur, either short-term or long-term:

Short-term impacts generally last only during construction, and the resources resume their pre-construction conditions following construction.

Long-term impacts last beyond the construction period, and the resources may not resume their pre-construction conditions for a longer period of time following construction.

- **Intensity** describes the degree, level, or strength of an impact. For this analysis, intensity has been categorized into negligible, minor, moderate, and major. Because definitions of intensity vary by resource topic, intensity definitions are provided separately for each impact topic analyzed in this Environmental Assessment.

Cumulative Effects

The Council on Environmental Quality (CEQ) regulations, which implement the National Environmental Policy Act of 1969 (42 USC 4321 et seq.), require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for both the No Action and Preferred Alternatives.

Cumulative impacts were determined by combining the impacts of the Preferred Alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects at Coronado National Memorial and, if applicable, the surrounding region. The geographic scope for this analysis includes elements mostly within the Memorial's boundaries, while the temporal scope includes projects within a range of approximately ten years. Given this, the following projects were identified for the purpose of conducting the cumulative effects analysis, listed from past to future:

- **Long term restoration of Montezuma Wash** would require further technical assistance and significant funding. There is a tremendous sediment and debris load within the Montezuma Wash watershed. This sediment would continue to naturally move downstream. The channel is restricted at the site of the historic culverts located near the visitor center. A long term solution needs to be developed to address the negative effect the twin historic culverts located near the visitor center is having on the natural functioning of the channel.

- **Grassland restoration** – Efforts are ongoing to restore the abandoned Montezuma Ranch area. Preliminary plans are to reduce non-native vegetation and construct an interpretive trail. The trail would focus on Coronado's expedition, the international border and the ecology of the area.
- **Exotic plant removal** – There are a number of exotic plants in the grasslands. Efforts to eradicate and eliminate these populations are ongoing.
- **International Boundary Fence** – Along the southern boundary of the memorial the Department of Homeland Security has constructed a pedestrian and vehicle barrier fence on the Mexico and United States border. Approximately eleven acres in the Montezuma Ranch area was used as a staging area for the construction activities in 2008 and it is currently in the early stages of revegetation project.
- **Border Patrol Tower at Montezuma Pass** – The Border Patrol intends to construct a camera tower at Montezuma Pass to aid in international border security. Construction could occur by the end of 2009.

Impairment

National Park Service's Management Policies, 2006 require analysis of potential effects to determine whether or not actions would impair park resources (NPS 2006). 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. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values. However, the laws do give the National Park Service managers discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values.

Although Congress has given the National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values. An impact to any park resource or value may constitute impairment, but an impact would be more likely to constitute impairment to the extent that it has a major or severe adverse effect upon a resource or value whose conservation is:

1. necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
2. key to the natural or cultural integrity of the park; or
3. Identified as a goal in the park's general management plan or other relevant National Park Service planning documents.

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park. A determination on impairment is made in the Conclusion section for each of the resource topics carried forward in this chapter.

Unacceptable Impacts

The impact threshold at which impairment occurs is not always readily apparent. Therefore, the Park Service applies a standard that offers greater assurance that impairment would not occur by avoiding unacceptable impacts. These are impacts that fall short of impairment, but are still not acceptable within a particular park's environment. Park managers must not allow uses that would cause unacceptable impacts; they must evaluate existing or proposed uses and determine whether the associated impacts on park resources and values are acceptable.

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

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

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

Visitor Use and Experience

Intensity Level Definitions

The *NPS Management Policies 2006* state that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the NPS is committed to providing appropriate high quality opportunities for

visitor to enjoy the parks. One of the park's management goals is to ensure that visitors are able to enjoy recreational opportunities that foster a better understanding and appreciation of the area's natural and human history.

The methodology used for assessing impacts to visitor use and experience is based on the ability of the visitor to experience a full range of park resources. These experiences were analyzed by examining resources and objectives presented in the parks significance statements, as derived from its enabling legislation. This analysis also focused on how visitor health and safety would be affected. The thresholds for this impact assessment are as follows:

Negligible: Visitors would not be affected or changes in visitor use and/or experience would be below or at the level of detection. Any effects would be short-term. The visitor would not likely be aware of the effects associated with the alternative.

Minor: Changes in visitor use and/or experience would be detectable, although the changes would be slight and likely short-term. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.

Moderate: Changes in visitor use and/or experience would be readily apparent and likely long-term. The visitor would be aware of the effects associated with the alternative, and would likely be able to express an opinion about the changes.

Major: Changes in visitor use and/or experience would be readily apparent to most visitors, severely adverse or exceptionally beneficial, and have important consequences. Many visitors would be aware of the effects associated with the alternative, and would likely express a strong opinion about the changes.

Short-term impact – occurs only during the project construction

Long-term impact – continues after project construction

Impacts of Alternative A (No Action Alternative)

The No Action Alternative could result in long-term moderate adverse effect to visitors from repetitive road closures. This will be especially true for the majority of visitors that experience the memorial from the roadway and wish to access the scenic views at Montezuma Pass. There would be periodic trail closures of the Coronado Cave Trail. Long term closure of the road could diminish the visitor experience and would be inconsistent with the memorial's purpose. This alternative could result in reduced opportunities for current and future visitors to enjoy, learn about Coronado and his importance in history. Access to much of the memorial's visitor use areas would be restricted if the road continues to erode and becomes unsafe for vehicle travel.

Cumulative Effects: Any construction activities have the potential to affect visitor use and experience. The construction of the Border Patrol Tower would likely have an adverse effect on the visitor experience as a result of noise, and dust. Projects such as road improvements, exotic vegetation management, and international border fence construction have had or could have an adverse effect on visitor use and experience because of the inconvenience of construction noise, dust, and possible off-limit areas. Ultimately, however, these actions would have or had a beneficial effect on visitor use and experience because of long-term improvements to the human health and safety aspects of the memorial; natural environment; interpretive opportunities; and functionality of the memorial. Potential improvements to the roadway would also have a beneficial effect on visitor use and experience. Under this alternative, although visitors may experience some delays from construction activities, visitor functions in the project area are not expected to change, and past actions have had beneficial impacts on visitor use and experience. Therefore, cumulatively, visitor use and experience would not appreciably change when considered with other past, present, and reasonably foreseeable future actions.

Conclusion: The No Action Alternative could result in long-term moderate adverse effect to visitors through repetitive road closures. This alternative would alter recreational use in the area and may decrease visitors to the memorial. There could be a threat to visitors from longer response times to emergency situations. Cumulatively, this alternative would have a moderate adverse effect on visitor use and experience if a long term road closure were necessary and that would unreasonably interfere with park programs and activities.

Impacts of Alternative B (Preferred Alternative)

Implementation of the Preferred Alternative would provide for an improved, safer road surface for visitors to use to access park areas, thus resulting in a beneficial effect. This alternative should reduce the potential for long-term road closures. Moving the Coronado Cave Trail out of Montezuma Wash would shorten the trail, and would reduce the need for repeated closures due to make flood repairs. This alternative could have a beneficial effect by reducing response times to visitor emergency response services. Ultimately, these actions would have a beneficial effect on visitor use and experience because of the improvements to the road infrastructure and human health and safety aspects of the memorial; continued interpretive opportunities; and functionality of the memorial.

Cumulative Effects: As described under alternative A, any construction activities have the potential to affect visitor use and experience. Recent construction of the international fence and Border Patrol Tower would likely have had or have an adverse effect on the visitor experience as a result of noise, dust, and unavailability to view some of the attractions in the monument. Projects such as road improvements, exotic vegetation management, and fence construction have had or could have an adverse effect on visitor use and experience because of the inconvenience of construction noise, dust, and possible off-limit areas. Ultimately, however, these actions would have or had a beneficial effect on visitor use and experience because of long-term improvements to the human health and safety aspects of the memorial; the visual and natural

environment; interpretive opportunities; and functionality of the memorial. Potential improvements to the roadway would also have a beneficial effect on visitor use and experience. Considering these past, present, and reasonably foreseeable future actions, the beneficial effects of the proposed projects would have a cumulative benefit to the overall visitor use and experience at the memorial.

Conclusion: Under the Preferred Alternative, the restoration of the roadway and Montezuma Wash channel would have a long-term minor beneficial effect on visitor use and experience. Construction disturbances (noise, dust, traffic) would have a minor, short term adverse effect to visitor use and experience. Cumulatively, this alternative would have a minor beneficial effect to visitor use and experience because ultimately this project combined with other past, present, and reasonably foreseeable future actions would benefit a number of visitor resources.

Park Operations

Intensity Level Definitions

Implementation of this project would affect the operations at the memorial such as the number of employees needed; the type of duties that need to be conducted; when/who would conduct these duties; how activities should be conducted; and administrative procedures. For the purpose of this analysis, the human health and safety of memorial employees is also evaluated. The methodology used to assess potential changes to memorial operations is defined as follows:

- Negligible:** Memorial operations would not be affected or the effect would be at or below the lower levels of detection, and would not have an appreciable effect on memorial operations.
- Minor:** The effect would be detectable, but would be of a magnitude that would not have an appreciable adverse or beneficial effect on memorial operations. If mitigation were needed to offset adverse effects, it would be relatively simple and successful.
- Moderate:** The effects would be readily apparent and would result in a substantial adverse or beneficial change in memorial operations in a manner noticeable to staff and the public. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.
- Major:** The effects would be readily apparent and would result in a substantial adverse or beneficial change in memorial operations in a manner noticeable to staff and the public, and be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed, could be expensive, and their success could not be guaranteed.

Short-term impact – occurs only during the project construction

Long-term impact – continues after project construction**Impacts of Alternative A (No Action Alternative)**

Moderate adverse long-term impacts to park operations related to emergency response (multiple agencies), trail maintenance and access restrictions to park staff from extended road closures. Long term road closure would result in impacts to health, safety and could unreasonably interfere with park programs.

The No Action Alternative would have a moderate adverse long-term effect on park operations at Coronado National Memorial. Park operations related to emergency response to border related incidences would be most affected at the memorial. Multiple agencies would be affected by a road in poor condition, subject to closures and possible failure. Long term road closures would result in impacts to health and safety. Road closures would unreasonably interfere with park interpretive programs. Frequent road closures would increase park maintenance operational costs and make access more challenging for researchers and resource managers.

Cumulative Effects: Any project that occurs in the memorial has an effect on operations; therefore, most of the actions listed in the cumulative scenario in the introduction of this chapter would have some degree of effect on employees and memorial operations. Under this alternative, there would be overall long-term moderately adverse cumulative impacts to efficiency and productivity of memorial operations associated with visitor services, maintenance, resource management and safety.

Conclusion: The No Action Alternative would have a long-term moderate, adverse effect on memorial operations due to the loss of productivity and efficiency. Visitor and staff safety could be compromised by a lack of accessibility to the border by law enforcement agencies and emergency response. Road restrictions and closures would have a moderate adverse effect on maintenance, resource management and research. Cumulatively, these effects would have a moderate long term impact on memorial operations when considered with other past, present, and reasonably foreseeable future actions.

Impacts of Alternative B (Preferred Alternative)

The restoration of the road way would have a beneficial effects on park operations from an improved work environment that meets health and safety standards. The cumulative effects to park operations would be beneficial. This alternative would better allow rangers and other agencies to meet their missions to provide emergency response for situations such as: law enforcement, medical, fire, and search and rescue and border related issues. Proposed road improvements reduce the potential for future road closures and the possibility of total road failure. There would be fewer impacts to public health, safety and park operations. These impacts would have beneficial effects on the productivity and efficiency of memorial operations.

Cumulative Effects: As described under Alternative A, any project that occurs in the memorial has an effect on park operations; therefore, most of the actions listed in the cumulative scenario in the introduction of this chapter would have some degree of effect on employees and memorial operations. Future road work could result in short-term traffic delays, but long-term beneficial improvements to road conditions. Overall long-term impacts would cumulatively have a moderate beneficial impact to memorial operations when considered with other past, present, and reasonably foreseeable future actions.

Conclusion: Alternative B would result in long-term beneficial effects to park operations by restoring the roadway and Montezuma Wash channel. There would be improved productivity of the memorial staff in providing visitor services, maintenance, resource management and border security. Cumulatively, the improvements associated with this alternative would have a beneficial effect on park operations when considered with other past, present, and reasonably foreseeable future actions.

Geology and Soils

Intensity Level Definitions

Implementation of this project could potentially impact geologic and soil resources. Available information on potential impacts from the alternatives was based on professional judgment and experience with similar projects. The threshold for the intensity of an impact on geology and soils is defined as follows:

Negligible: An action that could result in a change in a geologic or soil feature or process, but change would be so small that it would not be of any measureable or perceptible consequence.

Minor: An action on the geology and soil would be detectable, but would be of a magnitude that would not have an appreciable adverse or beneficial effect on the biological process. The effect would be in a small area, but it would appreciably increase potential for erosion. If mitigation were needed to offset adverse effects, it would be relatively simple and successful.

Moderate: The action would be readily apparent and would result in a noticeable change in a geologic feature or process; the change would be measureable and of consequence. The action would change the topsoil, overall productivity, or the potential for erosion. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.

Major: The effects would be readily apparent and would result in a substantial change in a geological feature or process. Erosion potential would be high for large quantities of soil, top soil loss. Key ecological processes would be altered, and landscape level changes would be expected.

Mitigation measures to offset adverse effects would be needed, could be expensive, and their success could not be guaranteed.

Short-term impact – occurs only during the project construction

Long-term impact – continues after project construction

Impacts of Alternative A (No Action Alternative)

Long term moderate adverse effects to geology and soils would continue in lower Montezuma Wash due to the twin historic culverts that restrict the channel. The channel above the historic culverts near the visitor center would continue to become sediment laden. Eventually the remaining sediment load will pass through the memorial but this could take many, many years to stabilize. The culverts will continue to have a long-term moderate adverse effect on the natural function of the channel. Because there would be no major adverse or unacceptable impact to geology or soils there would be no impairment of park resources or values.

Cumulative Effects: Any construction activities that require excavation or ground disturbance have the potential to affect soils and geology. The actions listed in the cumulative scenario would have some effect on the geology and soils of the memorial. The original construction of the East Montezuma Canyon Road in 1933 resulted in moderate adverse impacts to the geological processes and soils from earthwork and excavation. Ongoing road rehabilitation, repairs and general maintenance to drainage structures would have minor to moderate adverse effects to soil and geologic processes within the project area. Under this alternative soils and geology would continue to be disturbed at their current level. Cumulative impacts on geologic processes and soil erosion would remain moderate from past and current activities.

Conclusion: The No Action Alternative would have no new direct effect on the geology or soils at Coronado National Memorial that have not already occurred. Natural geologic processes still in motion from recent large magnitude storm events would continue. Stream flow and erosion would likely continue to erode the embankments at the roadway. As the roadway erodes materials used in its construction would be more likely to move through the aquatic system and be distributed over wide areas. Soil erosion at informal pull offs would continue to have an adverse effect on soils. Effects to geologic resources and soils would be long-term minor to moderate adverse impacts.

Impacts of Alternative B (Preferred Alternative)

Long term moderate adverse effects to geology and soils would continue in the lower channel above the double historic culverts at the visitor center. The culverts have been in place within the channel for 75 years and have a long-term moderate adverse effect on the natural function of the channel. Until the historic culverts can be addressed function to pass the large debris flows in the watershed the channel would continue to need routine maintenance to remove sediment. Because there would be no major adverse or unacceptable impacts to geology or soils there would be no impairment of park resources or values.

Cumulative Effects: As described under alternative A, any project that occurs in the memorial has an effect on soils and geology; therefore, most of the actions listed in the cumulative scenario in the introduction of this chapter would have some degree of effect. International fence construction will continue to have long-term moderate impacts to soils and geology of the memorial. Soils and geology associated with the current and future proposed projects and the proposed channel restoration would cumulatively have a moderate adverse impact to soils and geology when considered with other past, present, and reasonably foreseeable future actions.

Conclusion: Alternative B would have long-term minor adverse effects on geologic and soil resources from installation of road bank protection measures, from restoration of the channel and excavation for low water crossings. These disturbances would have a long-term adverse effect on the geologic and soil resources at localized sites. Formalizing pull offs to prevent their expansion, closing some informal pull offs would have a long term beneficial impact to soil resources. Construction of a new parking lot of the Coronado Cave Trail would have a long term minor adverse impact to soils. A long-term beneficial effect to soils following a short-term period of erosion during construction efforts is predicted to occur. However beneficial minor to moderate impacts would occur from stabilizing the roadway, installing the low water crossings to convey sediment loads and restoring the channel capacity. These measures would have a long-term minor to moderate adverse effect on the natural geologic processes in the stream channel. Excavation and construction of low water crossings would require additional disturbance of alluvial deposits to provide adequate hydraulic capacity to carry stream flow. Because there would be no major adverse or unacceptable impacts to geologic processes or soils, there would be no impairment of park resources or values.

Vegetation

Intensity Level Definitions

The predictions about short- and long-term impacts were based on professional judgment and experience with previous projects with similar vegetation. Impacts were assessed and discussed with local botanist and NPS biologists. The methodology used to assess potential changes to vegetation at the memorial from the proposals is defined as follows:

Negligible: The impacts on vegetation (individuals or communities) would not be measureable. The abundance or distribution of individuals would not be affected or would be slightly affected. The effects would be on a small scale and no species of special concern would be affected. Ecological processes and biological productivity would not be affected.

Minor: The action would not have an appreciable adverse or beneficial effect within the project area's biological productivity. The alternative would not affect the viability of local or regional populations or communities. Mitigations to offset adverse effects, including measures to avoid species

of concern, could be required and would be effective. Mitigations would be simple to implement and would likely succeed.

Moderate: The action would result in effects to some individual native plants and could also affect a sizeable segment of the species population. Permanent impacts could occur to native species of vegetation, but in a relatively small area. Some special status species could also be affected. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.

Major: The actions would have considerable effects on native plant populations, including special status species. The affect would occur over a large portion of the memorial. Extensive mitigations measures to offset adverse effects would be required, could be expensive, and the success could not be guaranteed.

Short-term impact – occurs only during the project construction

Long-term impact – continues after project construction

Impacts of Alternative A (No Action Alternative)

There would be no vegetation disturbed within the Montezuma Wash other than the disturbance that is naturally occurring from recent flooding events and aggraded channels. Long term negligible to minor adverse effect on road shoulder vegetation would continue from informal pull off parking activity. Negligible to minor adverse impact on vegetation from the continued erosion of the stream banks and maintenance activities associated with culvert cleaning. There would be no effect to trees since none would be removed and vegetation within the project area and within the wash would continue to experience minor impacts from pull offs and channel aggradation.

Cumulative Effects: Any construction activities that require excavation or ground disturbance would affect vegetation in the project area. The international border fence had a moderate long-term effect on vegetation. Similarly, proposed projects such as exotic plant removal, road rehabilitation, have the potential to adversely impact vegetation. Under this alternative, vegetation would continue to be disturbed. Therefore, this project would not contribute to the effects on vegetation when considered with other past, present, and reasonably foreseeable future actions.

Conclusion: The No Action Alternative would have an overall minor effect on vegetative communities either in terms of species composition or population dynamics other than those brought about by natural processes. A minor detrimental effect would occur on vegetation found in the disturbed area along the road shoulder from continued informal pull off parking. Cumulatively, these effects would have a negligible to minor impact to vegetation when considered with other past, present, and reasonably foreseeable future actions.

Impacts of Alternative B (Preferred Alternative)

Short term negligible adverse effects to vegetation in channel and along stream banks would occur. Minor beneficial effect from formalizing pull offs would be expected. Long term minor adverse effect to vegetation from continued maintenance within the stream channel to maintain flow through culverts is expected to occur. Removal of vegetation including the possibility of 30 trees (all commonly found species) would not adversely affect the viability or relative abundance of any vegetation species. There would be a minor short term adverse impact to as many as 30 trees within the wash but through revegetation efforts and natural processes these trees would re-grow. Beneficial impacts would occur from roadside revegetation projects proposed to occur in this alternative. Short term adverse impacts would occur to vegetation around proposed low water crossings and hardening some stream banks.

Cumulative Effects: As described under alternative A, any construction activities that require excavation or ground disturbance have the potential to affect vegetation. Past actions such as road construction, informal pull off creation, road maintenance and emergency repairs have had a long-term minor adverse impact on vegetation resources at Coronado National Memorial. Present and foreseeable actions, such as future road maintenance and formalizing pull offs could result in long term minor beneficial effects to vegetation. When considered with other past, present, and reasonably foreseeable future actions the effect of the no action alternative on vegetation would be long-term negligible to minor. Cumulatively, this would contribute a negligible to minor amount of disturbance to vegetation when considered with other past, present, and reasonably foreseeable future actions.

Conclusion: Alternative B would have short term negligible adverse effect to vegetation in the channel and along stream banks from channel restoration. Minor beneficial effect from formalizing pull offs. Long term minor adverse effect to vegetation from continued maintenance within the stream channel to maintain flow through culverts. Cumulatively, the improvements associated with this alternative would have a minor beneficial effect on vegetation when considered with other past, present, and reasonably foreseeable future actions. Because there would be no major adverse or unacceptable impacts to vegetation, there would be no impairment of park resources or values. Removing some common tree species from Montezuma wash and the road shoulder would be a short-term adverse effect.

CONSULTATION and COORDINATION

Internal Scoping

Internal scoping was conducted by an interdisciplinary team of professionals from Coronado National Memorial and subject matter experts. Interdisciplinary team members met on April 13, 2009 to discuss the purpose and need for the project; various alternatives; potential environmental impacts; past, present, and reasonably foreseeable projects that may have cumulative effects; and possible mitigation measures. The team also gathered background information and discussed public outreach for the project. Over the course of the project, team members have conducted individual site visits to view and evaluate the proposed construction site, and discussed the impact analyses associated with this assessment. The results of the April 2009 meeting are documented in this Environmental Assessment.

External Scoping

External (public) scoping was conducted to inform various agencies and the public about the proposal to construct a new operations facility at Coronado National Memorial and to generate input on the preparation of this Environmental Assessment.

External scoping was initiated with the distribution of a scoping letter to inform the public of the proposal to construct a new operations building, and to generate input on the preparation of this Environmental Assessment. The scoping letter dated February 18, 2009 was mailed to approximately 100 addresses including landowners adjacent to the memorial, various federal and state agencies, affiliated Native American tribes, local governments, and local news agencies. Information on the environmental assessment was also posted on the National Park Service website. The public was given 30 days to comment on the project beginning February 18, 2009.

During the 30-day scoping period, four responses were received from the public. All the responses were favorable and addressed specific requirements of their organization prior to construction. One of the memorial's affiliated Native American tribes, the Hopi Cultural Officer requested that the memorial advise the tribe if a prehistoric cultural resource is identified during the project.

Environmental Assessment Review and List of Recipients

The Environmental Assessment would be released for public review on June 27, 2009. To inform the public of the availability of the Environmental Assessment, the National Park Service would publish on its NPS Planning, Environment, and Public Comment PEPC and distribute a press release. Copies of the Environmental Assessment would be provided to interested individuals, upon request. Copies of the document would also be available for review at the memorial's visitor center and on the internet at www.nps.gov/coro and <http://parkplanning.nps.gov/>.

The Environmental Assessment is subject to a 30-day public comment period ending July 27, 2009. During this time the public is encouraged to post comments online at <http://parkplanning.nps.gov/> or mail comments to Superintendent; Coronado National Memorial. Following the close of the comment period, all public comments would be reviewed and analyzed, prior to the release of a decision document. The National Park Service would issue responses to substantive comments received during the public comment period, and would make appropriate changes to the Environmental Assessment, as needed.

Native American Consultation

Ak Chin Indian Community
Fort McDowell Tavapai Nation
Fort Sill Apache Tribe of Oklahoma
Mescalero Apache Tribe
Pueblo of Zuni
Hopi Tribe
Yavapai-Apache Tribe
Pascua Yaqui Tribe
Salt River Pima – Maricopa Indian Community
San Carlos Apache Tribe
Tohono O'odham Nation
Tonto Apache Tribe
White Mountain Apache Tribe
Tonto Apache Tribe

Environmental Assessment Review and List of Recipients

FEDERAL AGENCIES

Bureau of Land Management
International Boundary and Water Commission
National Park Service
Natural Resource Conservation Service
U.S. Office of Senator
U.S. House of Representative
U.S. Army Garrison, Fort Huachuca
U.S. Border Patrol
U.S. Customs Service
U.S. Drug Enforcement Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
U.S. Geological Survey
U.S.D.O.I. – Office of the Solicitor

STATE AND LOCAL AGENCIES

Arizona Department of Environmental Quality

Arizona Ecological Services
Arizona Game and Fish Department
Arizona State Historic Preservation Office
Arizona State Parks
Cochise County Board of Supervisors
Cochise County Planning and Zoning Department
Cochise County Sheriff's Office

BUSINESSES, ORGANIZATIONS, AND UNIVERSITIES

Arizona Star
Arizona Trails Association
Arizona Trailblazers Hiking Club
Arizona Wildlife Federation
Bat Conservation International
Bisbee Observer
Defenders of Wildlife
Douglas Daily Dispatch
Friends of the Huachuca Mountains
Hereford Natural Resources Conservation
Huachuca Audubon Society
Huachuca Hiking Club
KGUN News
KOLD News
Sierra Vista Herald
Southeastern Arizona Bird Observatory
Southern Arizona Hiking Club
Southwest Center for Biological Diversity
The Nature Conservancy
Thunder Mountain Trekkers
Tucson Audubon Society
Tucson Citizen
University of Arizona

INDIVIDUALS

A complete list is on file with the National Park Service Intermountain Region, Denver.

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Teresa Frederick, Wildlife Biologist

Kym Hall, Superintendent

Matt Stoffolano, Chief Ranger

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George Walton, Project Engineer, Short Elliott Hendrickson, Inc.

U.S. Department of Transportation Federal Highway Administration:

Tom Puto, Project Engineer Federal Highway Administration

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Sarah Wynn, Intermountain Region, Vegetation Specialist

Vicky Jacobson, Intermountain, Regional Historical Architect

Ron Beckwith, Western Archeological Conservation Center

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**Appendix A. US Fish and Wildlife Endangered Species Act No Effect
Determination for Coronado National Memorial Flood Mitigation Road
Repairs and Montezuma Wash Restoration**

To: Field Supervisor, Steve Spangle

From: Park Superintendent, Kym Hall

Date: June 25, 2008

Subject: Endangered Species Act No Effect Determination for Coronado National Memorial Flood Mitigation Road Repairs and Montezuma Wash Restoration

This memo is our notification that Coronado National Monument has analyzed the expected impacts of the monument's proposed Flood Mitigation Road Repairs and Montezuma Wash Restoration project within the subject Environmental Assessment. The project would involve the re-surface, restore and rehabilitate of the previously paved 3.5 miles of roadway within the memorial and to provide a sustainable drainage system along the paved portion of the roadway. The purposes of the project is to address healthy and safety concerns related to the aging roadway infrastructure, enhance the experience of park visitors and restore the aggraded channel within Montezuma Wash. Extreme flooding in recent years has altered the channel of Montezuma Wash and it is currently threatening the stability of the road. The Coronado Cave Trail is currently located within the channel of Montezuma Wash. Due to the extreme flooding events experienced in the past few years maintaining this portion of the trail has come at an increased expense and a repetitive maintenance issue. East Montezuma Canyon Road has been determined eligible for listing on the National Register of Historic Places by the Arizona State Historic Preservation Officer (SHPO). Informal vehicle pull offs along the road shoulder have developed without environmental planning. These pull off areas are primarily used by law enforcement agencies but occasionally they are used by park visitors. The memorial's location on the International Border results in a high volume of law enforcement vehicular traffic and parking along the road shoulder has increased in recent years.

Our analysis of impacts resulted in an Endangered Species Act determination of No Effect for the Mexican spotted owl (*Strix occidentalis lucida*), and the lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*). The Mexican spotted owl PAC is located on the western edge of the project area. The lesser long-nosed bat roost is located approximately .25 mile from the project and is a post maternity roost used during the summer months. The project is proposed to occur during the winter months when the bat is not resident in the memorial.

A pair of Mexican spotted owls was first found in the Memorial in 1997. Park staff monitored the status of spotted owls from 1997-2001 using methods described in the recovery plan (USDI 1995) for this species. They bred and successfully fledged young in 1997 and 1999 using the same nest site both times. The adults and their young were

banded (Duncan 1999) in accordance with federal and state guidelines. The owls were not detected in 2000 or 2001. Surveys were not conducted in 2002. Owls were not detected from 2003-2005. No surveys were conducted in 2006. In 2007 during a spring survey, one male owl was heard moving one night and a male and female were heard moving another night. Day visits were also conducted following these detections. No nest site was located during day or night surveys. The owls were not detected during surveys in 2008 or 2009. If roost or nest sites are identified, the park would restrict access to these areas between March and August in order to protect the Mexican spotted owls. Work close to the PAC would not occur between March and August. The proposed work on the west end of the project would occur during December through February.

Coronado National Memorial contains a large post-maternity colony of *Leptonycteris curasoae*. The colony consists of approximately 10,000 to 30,000 (B. Alberti, unpublished data) or more adult females and juveniles (Newton 2002) that arrive in July and are present into early October (Figure 4). The roost has been known since 1993 and is located in an abandoned mine adit which is the proposed project area. The adit was excavated sometime in the early 1800s and mining activity in the area ceased in the mid-1980's. The Memorial has not been well surveyed to determine the number of additional day and night roosts that might exist in natural caves and/or human-made tunnels. Several other large and small day roosts are known in abandoned mines and caves outside the Memorial on public and private lands. The colonies at those locations, all of which are more than 15 mi (24 km) from the Memorial, contain several thousand to 70,000 bats depending on the year. It is known that there is interchange between several of these colonies (Ober et al 2000).

The post-maternity colony is monitored by park staff or contractors, using methods recommended by the AZ Game and Fish Department (AZGFD 2004). External counts of the emergence flight are conducted in real time (by one or more observers) and videotaped using infrared light(s) for later counting. In addition to developing estimates of the *Leptonycteris* colony size, park staff also continually assesses the general security of the roost. The mine and abandoned road leading to it are inspected for signs of human activity, as is the general area.

Our Resource Manager Danielle Foster discussed the no effect determination with Jason Douglas on June 11, 2008. Based on her description of the project, Jason agreed there would be no effect. I understand that our No Effect determination does not require a response from your office; therefore we are proceeding with our implementation of the project. However, if you should have any concerns with our determination, we would appreciate hearing from you soon, so we can discuss it with you before proceeding too far with the project.