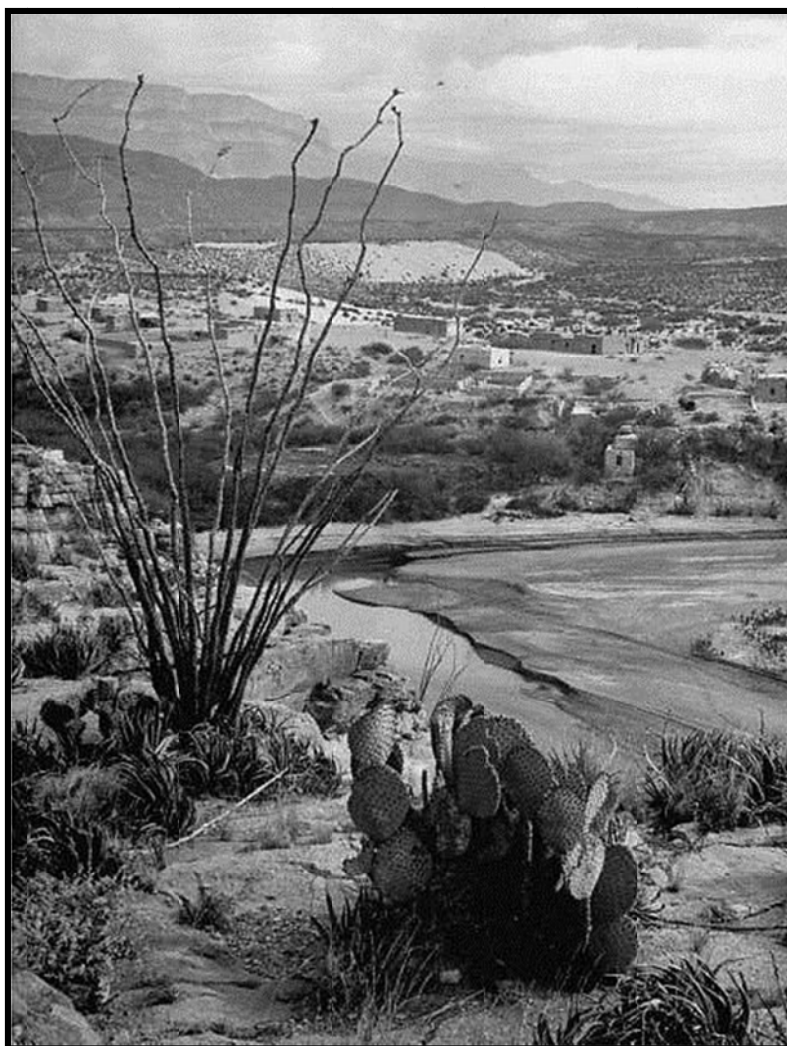




BOQUILLAS CROSSING VISITOR CONTACT STATION

ENVIRONMENTAL ASSESSMENT



Source: NPS 2011a.
Historic photo of Boquillas Crossing, circa 1950

PROJECT SUMMARY

INTRODUCTION

The National Park Service (NPS) proposes to construct a visitor contact station in Big Bend National Park (the park) to enhance opportunities for visitor understanding of the historical connections, travel, and use of the area near the Rio Grande. The visitor contact station would also house the equipment necessary to permit the area to function as a Class B port of entry (POE) between the United States and Mexico. The inclusion of such technology would facilitate the re-opening of the historic border crossing at Boquillas within Big Bend National Park, which was closed by the U.S. Department of Homeland Security (DHS) in the aftermath of the events of September 2001. Construction of the visitor contact station is proposed to begin in July 2011. The Class B POE opening is proposed for the April 2012.

This environmental assessment (EA) examines the effects on the natural and human environment associated with the proposed construction and operation of the proposed visitor contact station and establishment of a Class B POE at this location. This EA was prepared in accordance with the *National Environmental Policy Act* (NEPA) of 1969 and implementing regulations, 40 Code of Federal Regulations (CFR) 1500–1508, and NPS *Director's Order 12 and Handbook, Conservation Planning, Environmental Impact Analysis, and Decision Making*.

OVERVIEW OF THE PROPOSED ACTION

The purpose of reestablishing the Rio Grande crossing near Boquillas and constructing a visitor contact station is to provide visitor information and to support safe and secure international crossings of the Rio Grande. This new facility and re-established border crossing are intended to facilitate opportunities for visitors, scientists and researchers, and park and protected area managers to enter Mexico as well as permit residents on the Mexican side of the border to enter the United States to purchase goods and services and to visit friends and family living in nearby West Texas towns. Visitors to Boquillas would be able to purchase handicrafts from local residents, a traditional activity that has not been enjoyed since the border closed.

As set forth by the DHS, the visitor contact station and Class B POE are essential to support the following objectives:

- In addition to our mission to protect America, we have an obligation to facilitate trade and travel with Mexico. The creation of a port of entry near Boquillas in Big Bend National Park would facilitate travel within the Big Bend–Rio Bravo project area.
- The Class B POE at Boquillas would fill the void of a long stretch of border (approximately 290 miles) between Presidio and Del Rio where there is currently no port of entry.
- The presence of a port of entry would not contribute to vulnerability of the border. The partnerships with Mexico by Customs and Border Protection and NPS can only add to the cooperative environment developed over the last several years, which provides for continued security and commerce for both nations.
- The reinstatement of the ability to legally travel to Mexico from within the park would contribute to the security and welfare of visitors and would increase travel to the area.

Two alternatives are addressed in this EA:

- Alternative A: No Action
- Alternative B: Construction and Operation of a Visitor Contact Station (Preferred Alternative)

Impacts of the proposed alternatives were assessed in accordance with the *National Environmental Policy Act* and the *NPS Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision-making*. Several impacts topics were dismissed from further analysis because the proposed action would result in no impacts or negligible to minor or short-term impacts to those resources. No major impacts are anticipated as a result of this project.

HOW TO COMMENT

Agencies and the public are encouraged to review and comment on the contents of this EA during a 30-day public review and comment period. We invite you to comment on this plan and you may do so by any one of several methods. The preferred method of providing comments is on the NPS planning website: <http://parkplanning.nps.gov/bibe/>. You may also submit written comments to:

Superintendent
Big Bend National Park
Attention: Boquillas Crossing Visitor Contact Station EA
P.O. Box 129
Big Bend National Park, TX 79834

Only written comments will be accepted. Please submit your comments within 30 days of the posting of the notice of availability on the Planning, Environment and Public Comment (PEPC) web site. Please be aware that your entire comment will become part of the public record. If you wish to remain anonymous, please clearly state that within your correspondence, although we cannot guarantee that personal information, such as email address, phone number, etc. will be withheld. In addition, you must present a rationale for withholding this information. This rationale must demonstrate that disclosure would constitute a clearly unwarranted invasion of privacy. Unsupported assertions will not meet this burden. In the absence of exceptional, documentable circumstances, this information will be released. We will always make submissions from organizations or businesses, and from individuals identifying themselves as representatives of or officials of organizations or businesses, available for public inspection in their entirety.

Table of Contents

Chapter 1: Purpose of and Need for Action.....	1
Introduction.....	1
Project Background.....	1
History of Border Security at Boquillas.....	6
Current Status of the Crossing.....	6
Purpose of and Need for Action.....	7
Purpose and Significance of the Park.....	7
Objectives.....	8
Issues and Impact Topics.....	8
Impact Topics Dismissed from Further Analysis.....	9
Cultural Resources.....	10
Relationship to Laws, Executive Orders, Policies, and Other Plans.....	16
Applicable Federal and State Laws.....	16
National Park Service Directives and Director’s Orders.....	17
Impairment.....	18
Scoping Process and Public Participation.....	18
Internal and Agency Scoping.....	18
Public Scoping.....	19
Chapter 2: The Alternatives.....	20
Alternative A: No Action.....	20
Alternative B: The Preferred Alternative.....	21
Site Access and Parking.....	22
Visitor Contact Station.....	23
Class B Port of Entry.....	24
Rio Grande Access and Crossing.....	24
River Overlook and Trail.....	25
Utilities.....	25
Landscaping.....	27
Site Preparation and Grading.....	27
Construction Equipment and Materials Staging and Storage.....	27
Resource Protection Measures.....	28
Alternatives or Actions Eliminated from Further Study.....	31
Use of the Barker House.....	31

Use of the Rio Grande Visitor Center.....	31
Siting the Visitor Contact Station in Rio Grande Village.....	31
Use of the Border Crossing Facility in Mexico.....	32
Bridge (Pedestrian or Vehicular) Across the Rio Grande.....	32
Temporary Means to Open Border Immediately.....	32
The Environmentally Preferred Alternative.....	32
How the Alternatives Meet the Objectives.....	34
Chapter 3: Affected Environment.....	37
Visitor use and Experience.....	37
Visitation.....	37
Visitor Activities.....	38
Socioeconomics.....	39
Brewster County, Texas.....	40
Boquillas Area.....	41
Public Health and Safety.....	42
Park Operations and Management.....	43
Wild and Scenic Rivers.....	43
Water Resources.....	46
Floodplains.....	47
Soils and Vegetation.....	49
Soils.....	49
Vegetation.....	50
Wildlife and Wildlife Habitat, including Special-Status Species.....	50
Mammals.....	50
Birds.....	51
Reptiles and Amphibians.....	52
Fish.....	53
Special-Status Species.....	54
Federally-Listed Species.....	55
State-listed Species.....	57
Chapter 4: Environmental Consequences.....	60
General Analysis Method.....	60
Cumulative Effects Analysis Method.....	60
Relationship to Other Plans and Policies.....	61

NPS Plans and Projects.....	61
Projects and Plans Proposed by Other Agencies.....	63
Impact Topics.....	65
Visitor Use and Experience.....	65
Methods and Assumptions.....	65
Study Area.....	65
Impact Definitions.....	65
Impacts of Alternative A: No Action.....	66
Impacts of Alternative B: Preferred Alternative.....	67
Socioeconomics.....	68
Methods and Assumptions.....	68
Study Area.....	68
Impact Definitions.....	68
Impacts of Alternative A: No Action.....	69
Impacts of Alternative B: Preferred Alternative.....	70
Public Health and Safety.....	72
Impacts of Alternative A: No Action.....	72
Impacts of Alternative B: Preferred Alternative.....	74
Park Operations and Management.....	74
Impacts of Alternative A: No Action.....	75
Impacts of Alternative B: Preferred Alternative.....	76
Wild and Scenic Rivers.....	77
Methodology and Assumptions.....	77
Study Area.....	77
Impact Thresholds.....	77
Impacts of Alternative A: No Action.....	78
Impacts of Alternative B: Preferred Alternative.....	79
Water Resources.....	80
Methodology.....	80
Study Area.....	80
Impact Thresholds.....	81
Impacts of Alternative A: No Action.....	81
Impacts of Alternative B: Preferred Alternative.....	82
Floodplains.....	83

Methodology	83
Study Area	83
Impact Thresholds.....	83
Impacts of Alternative A: No Action.....	84
Impacts of Alternative B: Preferred Alternative	85
Soils and Vegetation	86
Soils	86
Methodology	86
Study Area	86
Impact Thresholds.....	86
Impacts of Alternative A: No Action.....	87
Impacts of Alternative B: Preferred Alternative	88
Vegetation.....	89
Methodology	89
Study Area	89
Impact Thresholds.....	89
Impacts of Alternative A: No Action.....	90
Impacts of Alternative B: Preferred Alternative	91
Wildlife and Wildlife Habitat, including Federally- and State-listed species.....	92
Methodology and Assumptions	92
Study Area	92
Impacts Thresholds	92
Wildlife.....	93
Impacts of Alternative A: No Action.....	93
Impacts of Alternative B: Preferred Alternative	95
Federally-listed species.....	97
Impacts of Alternative A: No Action.....	97
Impacts of Alternative B: Preferred Alternative	98
State-Listed Species	100
Impacts of Alternative A: No Action.....	100
Impacts of Alternative B: Preferred Alternative	100
Chapter 5: Consultation and Coordination.....	103
The Scoping Process	103
Internal Scoping.....	103

Public Scoping	103
Public Scoping Comments	104
Agency Consultation.....	104
Federal Departments and Agencies.....	104
Recipients of the Environmental Assessment	104
Federal Agencies.....	104
Texas State Agencies	104
Consulted Native American Groups	105
List of Preparers.....	105
References.....	106

List of Appendices

Appendix A: Impairment Determination	114
Appendix B: Floodplain Statement of Findings	123

List of Tables

Table 1. Issues and Impact Topics Retained for Analysis	9
Table 2. Resource Protection Measures of the Preferred Alternative	28
Table 3. How the Alternatives Meet the Objectives	34
Table 4. Summary of Impacts of the Alternatives	35
Table 5. Annual Big Bend National Park Visitation (2000 to 2009).....	37
Table 6. Federally- and State-Listed Species Potentially Associated with the Boquillas Crossing ¹	54
Table 7: Estimated Visitor and Resident Spending in the Park and Boquillas	71

List of Figures

Figure 1. Big Bend National Park Vicinity Map	2
Figure 2. Project Study Area.....	3
Figure 3. Boquillas Crossing Area Circa 1950	3
Figure 4. Preclosure Border Activity at Boquillas Crossing.....	4
Figure 5. Handicrafts Made by Boquillas Residents.....	5
Figure 6. Boquillas Crossing Sign Circa 1980.....	6
Figure 7. Wetlands Near the Proposed Visitor Contact Station.....	13
Figure 8. Access Road and Signage Indicating Road Closure.....	20
Figure 9. Conceptual Master Plan for the Proposed Project.....	21
Figure 10. Renderings of the Proposed Visitor Contact Station	22
Figure 11. Visitor Contact Station Concept Plan.....	24
Figure 12. Park Visitation by Month and Year (2000 to 2009)	38
Figure 13. Rio Grande Near Boquillas.....	44
Figure 14. Boquillas and the Sierra del Carmen Mountains	45
Figure 15. 100-Year Floodplain of the Project Area.....	48
Figure 16. Gravelly Upland Soils in the Project Area	49
Figure 17. Erosion Upstream Near the Former Automobile Crossing at Boquillas	78

Acronyms

ADA	Americans with Disabilities Act
BMP	best management practice
CBP	Customs and Border Protection
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DHS	Department of Homeland Security
DOI	Department of the Interior
DOI-SEMARNAP LOI	Letter of Intent between the DOI and the Secretariat of Environment, Natural Resources and Fisheries (SEMARNAP) of the United Mexican States for Joint Work in Natural Protected Areas on the United States-Mexico Border
EA	environmental assessment
EO	Executive Order
ESA	Endangered Species Act of 1973
FEMA	Federal Emergency Management Agency
FMP	fire management plan
FIRM	Flood Insurance Rate Map
FR	Federal Register
GMP	general management plan
LEED	Leadership in Energy and Environmental Design
NEPA	National Environmental Policy Act of 1969
NPS	National Park Service
PEPC	Planning, Environment, and Public Comment
POE	port of entry
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WSR	wild and scenic river
WSRA	Wild and Scenic Rivers Act

CHAPTER 1: PURPOSE OF AND NEED FOR ACTION

INTRODUCTION

Big Bend National Park (the park) was authorized by an act of Congress on June 20, 1935 and was established as such on June 12, 1944. The park is managed by the National Park Service (NPS). The park is located in southern Brewster County, Texas and encompasses more than 801,000 acres, just north of the United States and Mexico international border (figure 1). The Rio Grande forms the international boundary between the two countries. Approximately 13 percent (or 245 miles) of the international boundary is administered by the park, including the portion classified and protected as the Rio Grande Wild and Scenic River (WSR). Enabling legislation for the park states lands within the park “shall be, and are hereby, established, dedicated, and set apart as a public park for the benefit and enjoyment of the people” (49 Stat. 393).

This environmental assessment (EA) examines the effects on the natural and human environment associated with the proposed construction and operation of a visitor contact station and establishment of a Class B (remote, automated) port of entry (POE) on the Rio Grande between the United States and Mexico within the park. Alternative management concepts evaluated in this EA consider the reopening and the continued closure of the historic border crossing near the village of Boquillas, Mexico. Separate analyses are presented for the implementation of re-opening and the continuation of current management (alternative A, the no action alternative) of the border and the effects of such on specific resource topics. Alternative B, the reopening of the historic crossing, is the preferred alternative.

The study area or area of potential effect considered in the analyses includes Big Bend National Park, particularly those areas within close proximity to the project area. The socioeconomic and transboundary conditions analysis evaluates conditions for those areas near the project area, in nearby Boquillas, Mexico, and Brewster County as a whole. Figure 2 demonstrates portions of the study area including the river and upland areas.

This EA was prepared in accordance with the *National Environmental Policy Act* (NEPA) of 1969 and implementing regulations, 40 Code of Federal Regulations (CFR) 1500–1508, and NPS *Director’s Order 12* and *Handbook, Conservation Planning, Environmental Impact Analysis, and Decision Making* (NPS 2001).

PROJECT BACKGROUND

The people of the mountainous region along the United States–Mexico border have long shared the benefits and hardships of life in the rugged, arid landscape typical of the region. Shared experiences in ranching, farming, and mining have knit the small communities of the region together in a shared history, supporting cultural diversity and understanding.

During the mining era in the late 19th and early 20th centuries, American mining companies had interests in the region after lead, zinc, and silver deposits were discovered in the Sierra del Carmen Mountains in northern Mexico. Two towns (both named Boquillas) were established on either side of the Rio Grande. A smelter in the Mexican Boquillas was established to process minerals extracted from the mines, including the Puerto Rico Mine, which was one of the largest in the area. In 1894, D.E. Lindsey built an operation on the Texas side of the Rio Grande to receive ore mined and smelted in Mexico and transported across the river at Boquillas (Alex 2010).



Source: NPS 2004a.

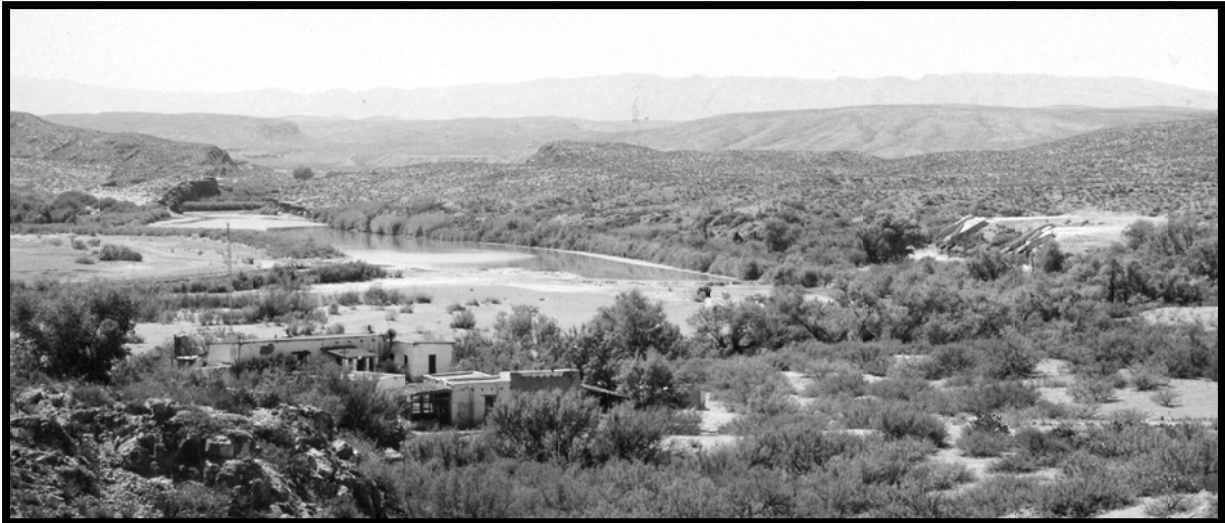
FIGURE 1. BIG BEND NATIONAL PARK VICINITY MAP



Source: NPS 2011a.

FIGURE 2. PROJECT STUDY AREA

Ore was smelted and delivered to Boquillas, Texas by a short tram offloading at the Barker Lodge, located near the proposed project area. When the Old Ore Terminal was in operation (from 1914 to 1919), ore was shipped via the Ore Road to Marathon, a small town located at the northern gateway to the park. The Boquillas crossing was used throughout the period as a ford on the river (Maxwell 1985). When fluorspar mining began in the early 1950s, ore mined in Mexico was trucked to the Boquillas crossing, which was enhanced with a riprap to support truck traffic. This continued until 1973 when fluorspar ore transport was shifted to La Linda (Maxwell 1985). As the ore resources were exhausted, Boquillas, Texas, was purchased and razed by the NPS while the Mexican Boquillas remained. Figure 3 illustrates the Boquillas crossing and adjacent areas around 1950.



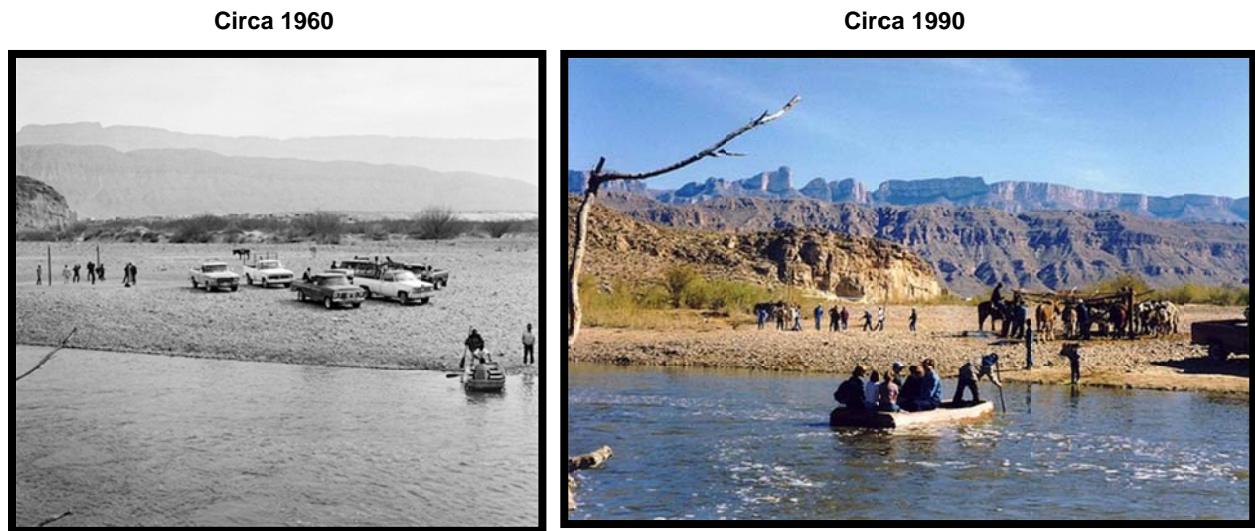
Source: NPS 2011a.

Note: United States on the right and Mexico on the left. The Barker House is in foreground.

FIGURE 3. BOQUILLAS CROSSING AREA CIRCA 1950

As the mines closed, the people of Boquillas, Mexico turned to their traditional handicrafts as a means of economic support. These goods were traded across the border via the Boquillas crossing. Mexican residents also used the crossing to acquire beans, rice, lard, and fresh produce from American vendors in the nearby Rio Grande Village (Alex, personal communication, 2011). The crossing served as a “cultural crossroads” and an active link between the two sides of the river (Halpern 2011).

Even before the park was established in 1944, residents on the Mexican side of the border used the crossing to trade handmade goods, buy food, and visit relatives living north of the border. Wading and boating were popular means by which park visitors crossed the river to Boquillas, Mexico. Visitors could also be ferried across the Rio Grande in a small boat and then ride a burro or horse up to Boquillas (figure 4).



Source: NPS 2011a.

FIGURE 4. PRECLOSURE BORDER ACTIVITY AT BOQUILLAS CROSSING

Boquillas was a small town with unpaved roads. There were a few local businesses, including places to eat and drink. Cantinas welcomed visitors with traditional Mexican fare, cold beer, tequila, or even sotol (a distilled spirit, which is also the state drink of Chihuahua). Residents would sell handmade goods and local handicrafts to visitors (figure 5). This visitor experience was very informal, and provided much needed income to the residents of Boquillas. Agriculture, including goat farming and horse ranching, is another primary source of income for Boquillas residents. Many Boquillas residents have close friends and family in nearby West Texas towns.

In addition to supplying goods and services to visitors, given the remoteness of many parts of the park, Mexican nationals who live in the small villages near the border have assisted in the park fire management program over the past two decades, a practice that has continued despite the border closure. Known to park staff as “Los Diablos” for their original promise to “fight fire like devils,” they provide crucial services in fighting wildfires and in implementing and managing prescribed fire as part of the ongoing commitment of the park to sustainable resource management.

The Boquillas crossing remained in use until shortly after the events of September 11, 2001. In May 2002, Customs and Border Protection (CBP), a division of the Department of Homeland Security (DHS), directed all informal international border crossings be closed until appropriate security measures could be implemented at these locations. As a result, the Boquillas crossing, in addition to other informal entrance

sites at the park, was closed. Entry into the United States other than official POEs is a violation of federal law.



Source: NPS 2011a.

FIGURE 5. HANDICRAFTS MADE BY BOQUILLAS RESIDENTS

With the closing of the crossing, opportunities for trade between vendors at Rio Grande Village and the residents of Boquillas have diminished significantly. The closest POE across the Rio Grande is located in Presidio, Texas – more than 100 miles from Boquillas, west of Big Bend Ranch State Park. Therefore, to reach Boquillas via an official POE requires hours of travel, particularly because some of the roads along the corridor are unpaved. There is currently very little economic activity between the nations near Boquillas.

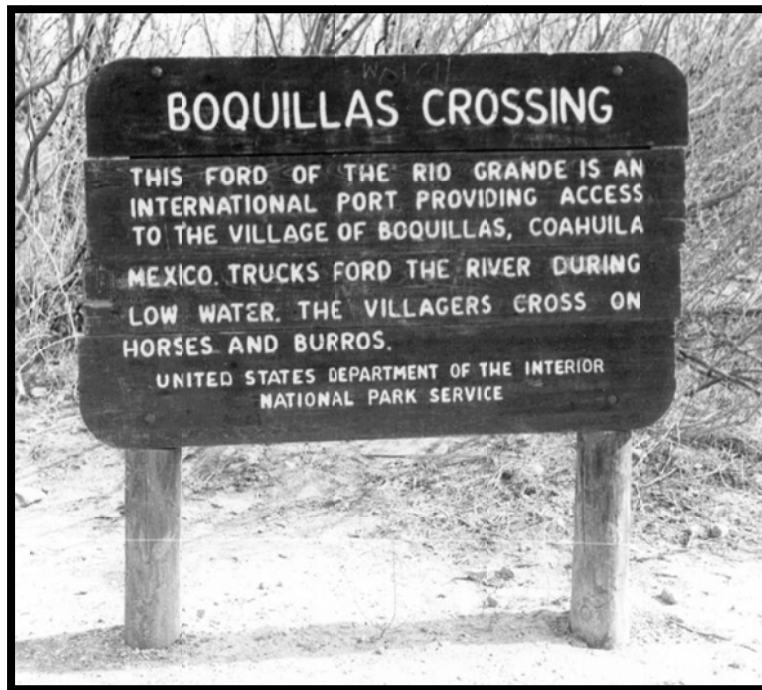
Since the border closure, park fire-fighting team members estimate the average income in Boquillas has decreased by 50 percent and its population declined by 66 percent. The park concessionaire, whose operation includes a store at Rio Grande Village, has estimated a \$270,000 (in 2009 dollars) decrease in annual revenue from the loss of visitor patronage to the southernmost parts of the park and purchases made by Boquillas residents. The concessionaire also estimates approximately 40 percent of store revenue was generated by purchases made by Boquillas residents (Elkowitz, personal communication, 2011).

The Money Generation Model from the Department of Parks, Recreation, and Tourism Resources at Michigan State University estimates visitor spending by visitor type (i.e., day tripper, non-local trips, overnight stays, and camping). The model, using information provided by park staff, estimates an additional \$1.46 million (in 2009 dollars) was lost at other local business establishments in Brewster County from decreased visitation resulting from the border closure (Elkowitz, personal communication, 2011).

Local residents have long lobbied for the reopening of the crossing, which has also been a priority for the NPS. U.S. President Barak Obama and Mexican President Felipe Calderon have expressed their support for the project stating reopening the crossing is a high priority matter between the nations. The opening would support protection and understanding of the rich cultural and biodiversity of the region (Halpern 2011).

HISTORY OF BORDER SECURITY AT BOQUILLAS

Passage across the Rio Grande at Boquillas has historically been for local use only, as demonstrated in figure 6, which indicates the small-scale nature of the crossing. The rugged landscape and absence of paved roads on the Mexican side of the border have prevented large-scale use of the crossing for goods, labor, or illegal activity. Before the border closure, only legal U.S. citizens and others with appropriate documentation for entering the United States were permitted. All persons were subject to inspection once in the United States. There have been few issues associated with human or drug trafficking in the area.



Source: NPS 2011a.

FIGURE 6. BOQUILLAS CROSSING SIGN CIRCA 1980

Before the border closure, there were two border patrol agents living in the park. Since that time, DHS has maintained a presence in the park. Following the closure, additional agents were added in the park and general NPS law enforcement in the park has been increased. This increase, which has occurred along the entire United States–Mexico border, is related to national policies to fight drug trafficking and other criminal activity (see “Chapter 4: Environmental Consequences”).

CURRENT STATUS OF THE CROSSING

On January 6, 2011, CBP Commissioner Alan Bersin visited the Boquillas crossing and announced the federal government proposal to establish a Class B POE on the Rio Grande within the park. This would formally establish a legal means of entry into the United States, consistent with local traditions. Bersin described the opening of the crossing as a highly important event and further indicated that both countries could benefit from reopening of the crossing. Bersin indicated remote technology would be used to maintain security and verify the identity of those entering with passports, visas, or crossing cards (Halpern 2011). The equipment and technology required by CBP would be housed within the proposed NPS visitor contact station, and monitored by CBP agents at other locations. This remote port entry program was successfully implemented along the Maine–Quebec, Canada border in 2004.

PURPOSE OF AND NEED FOR ACTION

The “Purpose” of a plan or action explains what the plan or action alternative as evaluated in the EA is intended to accomplish. Purpose is an overarching statement of what the plan must achieve to be considered a success.

The purpose of reestablishing the Rio Grande crossing near Boquillas and constructing a visitor contact station is to provide visitor information and to support safe and secure international crossings at this historic crossing of the Rio Grande. This new facility and subsequent re-opening of the border crossing is intended to facilitate opportunities for visitors, scientists and researchers, and park and protected area managers to cross the river into Mexico as well as permit residents on the Mexican side of the border to enter the United States to purchase of goods and services from concessioners within the park and to visit friends and family living in nearby West Texas towns. Visitors to Boquillas would be able to purchase handicrafts from local residents, a historic activity that has not been enjoyed since the border closed.

The “Need” for a plan or action explains why action is needed. Need is an overarching statement as to why action is required, highlighting critical elements of the planning issues stated above. As set forth by the DHS, the visitor contact station and Class B POE are essential to support the following objectives:

- In addition to our mission to protect America, we have an obligation to facilitate trade and travel with Mexico. The creation of a port of entry near Boquillas in Big Bend National Park would facilitate travel within the Big Bend–Rio Bravo project area.
- The Class B POE at Boquillas would fill the void of a long stretch of border (approximately 290 miles) between Presidio and Del Rio where there is currently no port of entry.
- The presence of a port of entry would not contribute to vulnerability of the border. The partnerships with Mexico by the CBP and NPS can only add to the cooperative environment developed over the last several years, which provides for continued security and commerce for both nations.
- The reinstatement of the ability to legally travel to Mexico from within the park would contribute to the security and welfare of visitors and would increase travel to the area.

PURPOSE AND SIGNIFICANCE OF THE PARK

Established as Texas Canyons State Park in May 1933, the park name was changed to Big Bend State Park in October of the same year. The park was authorized by Congress as a national park on June 20, 1935 and was established as such on June 12, 1944 (49 State. 393; 61 Stat. 91) to preserve and protect a representative area of the Chihuahuan Desert along the Rio Grande for the benefit and enjoyment of present and future generations. The park includes rich biological and geological diversity, cultural history, recreational resources, and outstanding opportunities for bi-national protection of shared resources.

The purpose of Big Bend National Park is fourfold:

- Conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations (NPS *Organic Act of 1916*);
- Preserve and protect all natural and national register-eligible cultural resources and values;

- Provide educational opportunities to foster understanding and appreciation of the natural and human history of the region; and
- Provide recreational opportunities for diverse groups compatible with the protection and appreciation of park resources.

The park is significant because it contains the most representative example of the Chihuahuan Desert ecosystem in the United States. The park's river, desert, and mountain environments support an extraordinary richness of biological diversity, including endemic plants and animals, and provide unparalleled recreation opportunities. The geologic features and Cretaceous and Tertiary fossils in the park furnish opportunities to study the sedimentary and igneous processes. Archeological and historic resources provide examples of cultural interaction in the Big Bend region and varied ways humans adapted to the desert and river environments.

Beyond its banks, the Rio Grande is life sustaining for plants, animals, and human inhabitants. Along with the three Mexican protected areas for flora and fauna (Maderas del Carmen, Cañon de Santa Elena, and Ocampo), Big Bend Ranch State Park, and Big Bend National Park is now part of one of the largest transboundary protected areas in North America. More than two million acres of Chihuahuan Desert resources in addition to over 200 miles of the Rio Grande are now under the national protection of the United States and Mexico.

OBJECTIVES

Objectives are what must be achieved to a large degree for the action to be considered a success. Each alternative selected for detailed analysis in the EA must meet project objectives, and resolve the purpose of and need for action. The following objectives were developed for this project:

- Provide the facilities needed for a secure and legal Class B POE for entry to the United States from Mexico;
- Facilitate international cooperation in the management of natural areas of bi-national interest; and
- Enhance opportunities for visitor understanding of the historical cross border connections, travel, socioeconomics, and sustainable use of the area as well as current cross border requirements for travel.

ISSUES AND IMPACT TOPICS

Impact topics for this project were identified on the basis of public input, federal laws, regulations, executive orders, NPS *Management Policies 2006* (NPS 2006a), and NPS knowledge of resources within the park. Impact topics carried forward for further analysis in this EA are listed below along with their reason for inclusion. Table 1 identifies those issues associated with development of the visitor contact station and re-opening of the border crossing for each impact topic retained for further analysis.

TABLE 1. ISSUES AND IMPACT TOPICS RETAINED FOR ANALYSIS

Issue	Associated Topic
The proposed project would provide access to areas outside the park historically enjoyed by park visitors. Information and interpretation of park history as well as natural and cultural resources would be provided. The proposed project would potentially enhance the visitor experience in this part of the park. Overall park visitation may increase slightly as some visitors may be drawn to the area because of the renewal of such visitor experiences.	Visitor Use and Experience
The re-opening of the border crossing at Boquillas would allow visitors to freely cross the border into Mexico to purchase goods and services from the small community. The re-opening would attract visitors, who would make purchases from the park concessionaire, to points further south in the park. Similarly, the residents on the Mexican side of the border would be able to enter the United States to purchase goods and services from concessioners within the park. Visitors would be able to purchase handicrafts made by local residents when visiting Boquillas. These exchanges would likely result in socioeconomic changes on both sides of the river.	Socioeconomic and Transboundary Conditions
Improving park health and safety for park visitors is a primary objective of the proposed project. Park staff and the public raised issues related to park health and safety related to visitor access.	Public Health and Safety
The proposed construction of the visitor contact station and subsequent re-opening of the international border crossing between the United States and Mexico at Boquillas, Texas would require additional staff support for law enforcement, interpretation and education, and administration efforts to manage the new requirements. The effectiveness of the proposed project would be monitored by NPS staff. Increased staff near the proposed project could have a measurable effect on the park staff and how/where they conduct their work.	Park Operations and Management
The proposed project includes the removal of the old rip-rap from the former truck and vehicle crossing. The removal of such could affect bank stability and water quality, both important characteristics of the Rio Grande WSR, over the short term.	Wild and Scenic Rivers
Big Bend National Park is committed to conserve scarce water resources, and will not increase potable water use beyond the historical range of use. However, water use at the visitor contact station would be provided from the same groundwater source as that serving Rio Grande Village. An analysis of this topic is needed to ensure historic demand rates are not exceeded, and groundwater resources would not be overextended.	Water Resources
The analysis will evaluate the potential for the proposed project to be located within the 100-year floodplain and the possible implications of such in terms of future damage or loss to the visitor contact station.	Floodplains
Construction activities associated with the proposed project would disturb soils, plants, and wildlife.	Soils and Vegetation Wildlife
Two species of federally listed fish, one candidate species of freshwater mussel, and one federally listed bird species have the potential to live in or near the Rio Grande near the proposed project area.	Threatened and Endangered Species

IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

The NPS defines “measurable” impacts as moderate or greater effects. It equates “no measurable effects” as minor or less effects. “No measurable effect” is used by the NPS in determining if a categorical exclusion applies or if impact topics may be dismissed from further evaluation in an EA or environmental impact statement. For this EA, the use of “no measurable effects” pertains to whether the NPS dismisses

an impact topic from further detailed analysis. The reason the NPS uses “no measurable effects” to determine whether impact topics are dismissed from further evaluation is to concentrate on the issues that are truly significant to the action in question, rather than amassing unnecessary detail in accordance with Council on Environmental Quality (CEQ) regulations at 1500.1(b).

Impact topics were dismissed from further evaluation in this EA if they met any the following conditions:

- Resources or values do not exist in the analysis area;
- Resources or values would not be affected by the proposed project, or the likelihood of impacts are not reasonably expected; and/or
- Through the application of mitigation measures, there would be minor or less effects (i.e., no measurable effects) from the proposed actions, and there is little controversy on the subject or reasons to otherwise include the topic.

The following impact topics were eliminated from further analysis in this EA. A brief rationale for the dismissal of each impact resource or value is provided. Impacts to these resources would be minor or less, localized, or most likely undetectable, if they were to occur.

CULTURAL RESOURCES

Historic Structures

NPS *Management Policies 2006* and NPS *Director’s Order 28: Cultural Resource Management*, state management decisions and activities throughout the NPS must reflect awareness of the irreplaceable nature of these resources (NPS 2006a). Section 106 of the *National Historic Preservation Act* requires federal agencies to take into account the effects of their undertakings on historic properties and to afford the Advisory Council on Historic Preservation an opportunity to comment in the consultation process.

Within the park, there are eight historic districts listed on the National Register of Historic Places including Castolon Historic District; Hot Springs Historic District; Mariscal Mine Historic District; Homer Wilson Blue Creek Ranch District; Sublett Farm (Rancho Estelle) Historic District; Daniels Farm House; Burro Mesa Archeological District; and Luna’s Jacal (NPS 2010a). In total, there are 69 buildings or structures on the List of Classified Structures maintained by the National Register. Because the proposed project would not affect any historic structures within the park, the topic of historic structures was dismissed for further analysis. The park consulted with the Texas State Historical Preservation office, the Texas Historical Commission, for concurrence with negative findings by the park for the NPS survey.

Archeological Resources

In addition to the *National Historic Preservation Act* and NPS *Management Policies 2006*, NPS *Director’s Order 28A: Archeology* affirms a long-term commitment to the appropriate investigation, documentation, preservation, interpretation, and protection of archeological resources inside units of the NPS. The majority of the proposed project area was previously disturbed by road building, filling, grading, and trenching. As a result, impacts to archeological resources are not anticipated. Although unlikely, if such resources are discovered, protective mitigation measures would be undertaken (see table 2 in “Chapter 2: The Alternatives”). Therefore, this topic was dismissed from further analysis in this document.

Ethnographic Resources

NPS *Director's Order 28: Cultural Resource Management* defines ethnographic resources 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. Big Bend National Park staff have/have not determined whether ethnographic resources are present inside park boundaries. Previous Native American consultation efforts have revealed that a number of tribes claim a certain level of affiliation with the lands within the park; however, during public scoping, they did not express concern over ethnographic resources in the area. Therefore, this impact topic was dismissed from further consideration.

Cultural Landscapes

According to the NPS *Director's Order 28: Cultural Resource Management*, a cultural landscape is a reflection of human adaptation and use of natural resources. It is often expressed in the way land is organized and divided, settlement patterns, land use, circulation systems, and the types of structures built. Themes and context define eligibility for the National Register of Historic Places, but cultural landscapes define physical settings where cultural and natural resources are managed together.

Big Bend National Park has many cultural landscapes relating to various classic themes of the West and time periods from prehistory to the 20th century. The park's 1999 Cultural Landscape Inventory identified three major cultural landscapes – Chisos Basin, Terlingua Abajo, and Castolon Valley – worthy of immediate inclusion on the National Register of Historic Places (NPS 1999). In addition eight other locations, including the Boquillas Valley, were identified with important cultural landscape components. In the Boquillas Valley, themes include Native American use, floodplain agriculture, mining, and U.S. – Mexico relations and conflicts. Historic properties identified in this landscape include three near the proposed project area – the ore tramway, the Barker Lodge, the former Boquillas community in Texas.

The project area is just south of the Boquillas, Texas community site that now consists of foundations and rubble remains. The Barker House is just northeast of the Boquillas site overlooking the river. Although the project site could be visible from both the town site and the Barker Lodge, impacts to the cultural landscape are expected to be negligible. The visitor contact station would be architecturally compatible with the Barker House, and floodplain vegetation would screen the building from full view at either site. In addition, one component of the project would be the restoration and interpretation of the cultural linkage between the U.S. and Mexico at the Boquillas crossing, an important theme of the site's history. Because impacts to the cultural landscape would be minimal, this topic has been dismissed from further consideration.

Museum Collections

NPS *Management Policies 2006*, NPS *Director's Order 28: Cultural Resource Management Guidelines*, and NPS *Director's Order 77-2: Floodplain Management* require irreplaceable museum items, archival materials, photographs, natural and cultural specimens, artifacts, and other collections within the park be protected from threats by natural physical processes. The proposed action would have no effect on the park museum collection; therefore, this topic was dismissed from further evaluation.

Night Sky Management

In accordance with NPS Management Policies 2006, the NPS strives to preserve natural ambient lightscapes and protect night sky viewing, which are natural resources and values existing in the absence of human-caused light (NPS 2006a). Recent studies indicate night skies in the park to be the best preserved in the lower 48 states. No construction would occur at night. Once open, the proposed hours of operation for the visitor contact station would be from approximately 8:00 a.m. until 6:00 p.m. daily. To discourage night crossing, no site lighting would be used beyond low voltage. Shielded lamps would be used, which would not measurably interfere with natural lightscapes or detract from appreciation of night skies. Such lights would be directed downward and in compliance with NPS guidance. Therefore, this topic was dismissed from further analysis.

Wilderness

In 1984, the administration of President Reagan recommended Congress designate 533,900 acres of the park as federally protected wilderness. At present, Congress has not yet designed the lands as such, and in accordance with the *Wilderness Act* of 1964 and NPS policies, the NPS manages these lands as though they have such designation. The proposed project areas lie outside of the proposed wilderness area and would not likely meet the criteria established in the *Wilderness Act* of 1964. Therefore, this impact topic was dismissed from further consideration.

Soundscape Management

NPS *Director's Order 47: Soundscape Preservation and Noise Management* directs parks to address excessive and inappropriate noise (NPS 2004b). Appropriate sounds are those consistent with the park enabling legislation. Visitor access to the proposed project area is permitted via walking, horseback riding, or rafting; however, vehicular access to the site is not currently permitted. During construction of the proposed project, there would be short-term impacts to the local soundscape near the Boquillas crossing. Visitation to this area is relatively low and disturbance during construction activities would be minimal and isolated. Therefore, visitors would not be adversely affected by noise associated with construction of the proposed project. No or very little long-term changes to the site soundscape would be anticipated because of the proposed project. Therefore, this topic was dismissed from further analysis.

Wetlands

For regulatory purposes under the *Clean Water Act*, the term wetlands means “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.”

Executive Order (EO) 11990, *Protection of Wetlands*, requires federal agencies to avoid, where possible, adversely impacting wetlands. Furthermore, §404 of the *Clean Water Act* authorizes the U.S. Army Corps of Engineers (USACE) to prohibit or regulate, through a permitting process, discharge or dredged or fill material, or excavation within waters of the United States. NPS policies for wetlands, *NPS Management Policies 2006* and *Director's Order 77-1: Wetlands Protection*, strive to prevent the loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

The proposed project area would be close to but not in nearby wetland areas (figure 7). Groundwater seeps support two wetlands adjacent to the proposed project area. The wetlands combined area is 1.5 acres. Exotic plants would be removed from the wetland boundary areas as part of the proposed project. The trail to the river, running between the wetland areas, has been present and in use since the park was

established. Under the proposed action, this trail would be reduced in width and stabilized. The wetlands would not be entered or disturbed during the construction period. No ground disturbance near the sources of groundwater that support the wetlands is planned. During construction activities, best management practices (BMPs) for erosion control would be implemented to specifically protect wetlands from sediments or runoff. It is not anticipated that effects to adjacent wetlands would be measurable; therefore, this topic was dismissed from further analysis.

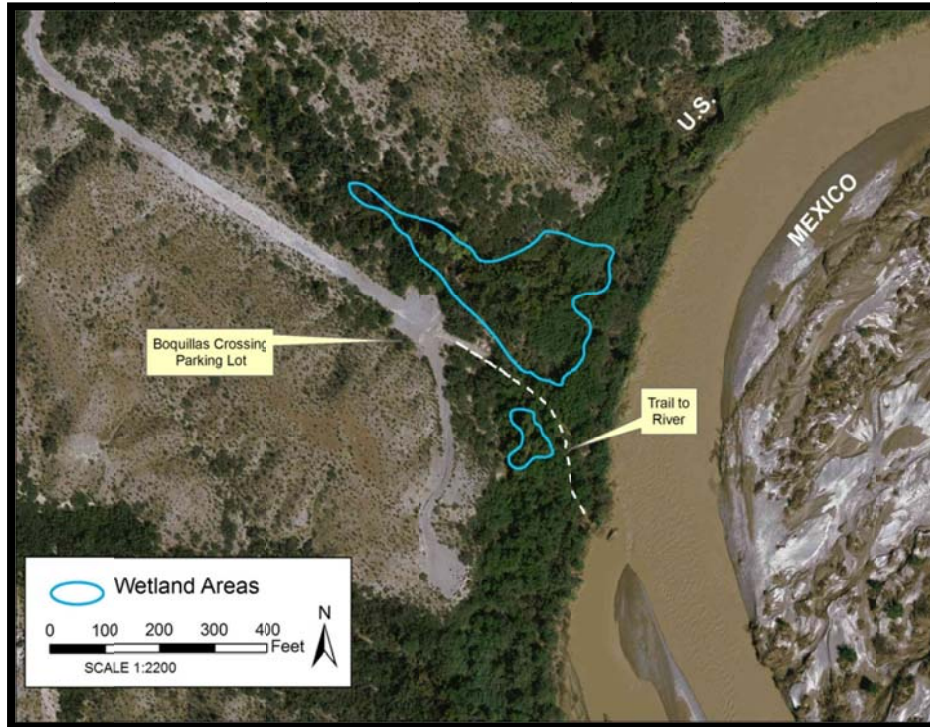


FIGURE 7. WETLANDS NEAR THE PROPOSED VISITOR CONTACT STATION

Air Quality

Among the high-value resources at Big Bend National Park are its panoramic views. When regional air quality is good, visitors can view the landscape up to 100 miles away. Unfortunately, pollution is gradually degrading these views, with hazy conditions limiting visibility to less than 30 miles 6 percent of the time. Nearly half of Big Bend's visibility reduction is due to sulfates that can be traced to origins as far away as East Texas, Louisiana, the Gulf Coast, and Mexico. Data suggest that sulfur emissions from nearby Texas and Mexico coal-fired power plants and industrial processes help create the white haze that often diminishes or obscures the scenic landscapes in Big Bend National Park (NPS 2010r).

The project area is remote and undeveloped. There are no notable sources of air pollutants nearby. During construction activities associated with the proposed project, local air quality would be adversely affected by the operation of construction equipment and fugitive dust. Both of these sources would be managed by limiting idling time of vehicles and managing construction dust by the application of water. Impacts to air quality would be localized, short-term, and not likely measurable. Therefore, this topic was dismissed from further analysis.

Paleontological Resources

According to NPS *Management Policies 2006*, paleontological resources (fossils), including organic and mineralized remains in body or trace form, will be protected, preserved, and managed for public education, interpretation, and scientific research (NPS 2006a). The majority of the proposed project area was previously disturbed by road building, filling, grading, and trenching. As such, impacts to paleontological resources are not anticipated. Although unlikely, if such resources are discovered, protective mitigation measures would be undertaken (see table 2 in “Chapter 2: The Alternatives”). Therefore, this topic was dismissed from further analysis.

Prime and Unique Farmlands

Prime farmlands have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Unique farmlands are defined as land other than prime farmland used for production of specific, high-value food and fiber crops. Both categories require the land be available for farming uses (CEQ 1980). Lands within the park are not available for farming and therefore do not meet these definitions. Therefore, this impact topic was dismissed from further consideration.

Indian Trust Resources and Sacred Sites

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. No formerly established or recognized Indian trust resources or sacred sites have been identified at Big Bend National Park, and this impact topic was dismissed from further consideration.

Environmental Justice

EO 12898 *Federal 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 or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. Guidelines for implementing this executive order under NEPA are provided by the Council on Environmental Quality (CEQ 1997). According to the U.S. Environmental Protection Agency, environmental justice is defined as:

The fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies. The goal of this “fair treatment” is not to shift risks among populations, but to identify potentially disproportionately high and adverse effects and identify alternatives that may mitigate these impacts (USEPA 1998).

There are minority and low-income populations in the general vicinity of the park. However, environmental justice was dismissed as an impact topic for the following reasons:

- NPS staff actively solicited public participation as part of the planning process and gave equal consideration to input from all persons, regardless of age, race, income status, or other socioeconomic or demographic factors;

- Impacts associated with the construction and operation of the proposed project would not disproportionately affect any U.S. minority and/or low-income populations or communities;
- Implementation of the proposed project would not result in adverse effects specific to minority and/or low-income populations or communities; and
- NPS staff does not anticipate adverse impacts on public health and safety or the human environment would fall appreciably more severely or result in disproportionately high and adverse impacts to minority and/or low-income populations or communities in the area.

Therefore this topic was dismissed from further consideration.

Conflicts with Land Use Plans, Policies, or Controls

The NPS must consider the possible effects on future planning efforts or land use and development patterns on adjacent or nearby lands. The project area for the proposed visitor contact station is adjacent to the international border between the United States and Mexico. The United States and Mexican governments are involved in management of lands on either side of the border for protection of natural and cultural resources. It is anticipated the proposed project would beneficially affect the village of Rio Grande Village and Boquillas, Mexico (see Socioeconomics in “Chapter 3: Affected Environment” and “Chapter 4: Environmental Consequences”). It is anticipated the proposed project is consistent with other local and regional planning efforts. As a result, this topic was dismissed from further consideration.

Energy Efficiency and Conservation Potential

Under each of the alternatives evaluated in this EA, the NPS would continue to implement its policies of reducing costs, eliminating waste, and conserving resources by using energy-efficient and cost-effective practices (NPS 2006a). Additionally, the NPS would continue to look for energy-saving opportunities in all aspects of park operations. Final design for the proposed visitor contact station meets Leadership in Energy and Environmental Design (LEED) Silver sustainability plus status. Because the NPS would promote energy efficiency under both of the alternatives, this impact topic was dismissed from further consideration.

Natural or Depletable Resource Conservation Potential

Depletable resources would be used during construction of the visitor contact station, including mined materials used in building materials and fossil fuels used to power construction equipment. However, the scale of the proposed project would not likely result in local or regional measurable changes in use of these resources. As mentioned in the previous paragraph, the structure would be designed to comply with LEED guidance on energy conservation. Therefore, this impact topic was dismissed from further consideration.

Climate Change and Sustainability

Climatologists are unsure about the long-term results of global climate change, but it is clear the planet is experiencing a warming trend that affects ocean currents, sea levels, polar sea ice, and global weather patterns. Although these changes are likely to affect winter precipitation patterns and amounts in the parks, it would be speculative to predict localized changes in temperature, precipitation, or other weather changes, in part because there are many variables not fully understood and there may be variables not currently defined. The construction and operation of a visitor contact station and Class B POE would have no effect on climate change, and would not likely be affected by climate change in the near future.

Therefore, the analysis in this document is based on past and current weather patterns and the effects of future climate changes are not discussed further.

RELATIONSHIP TO LAWS, EXECUTIVE ORDERS, POLICIES, AND OTHER PLANS

APPLICABLE FEDERAL AND STATE LAWS

National Park Service Organic Act of 1916

By enacting the NPS *Organic Act of 1916*, Congress directed the U.S. Department of Interior and the NPS to manage units “to conserve the scenery and the natural and historic objects and wildlife therein and to provide for the enjoyment of the same in such a manner and by such a means as will leave them unimpaired for the enjoyment of future generations” (16 USC 1). The *Organic Act* and its amendments afford the NPS latitude when making resource decisions to balance resource preservation and visitor recreation.

National Environmental Policy Act of 1969, as Amended

The NEPA was passed by Congress in 1969 and took effect on January 1, 1970 to establish environmental policies, including the goal of achieving productive harmony between human and physical environments for present and future generations. It provides the tools to implement these goals by requiring every federal agency to conduct an in-depth study of potential impacts of “major federal actions having a significant effect on the environment” and alternatives to those actions. NEPA is implemented through CEQ regulations (40 CFR 1500–1508) (CEQ 1978). The NPS has adopted procedures to comply with NEPA and CEQ regulations. These procedures are found in *Director’s Order 12: Conservation Planning, Environmental Impact Analysis, and Decision Making* (NPS 2001), and its accompanying handbook.

Endangered Species Act of 1973, as Amended

The *Endangered Species Act of 1973* (16 USC 1531, *et seq.*) requires an evaluation of the effects of proposed actions on all federally-listed species, including threatened, endangered, and candidate species, and those proposed for listing. It also applies to designated “critical habitat” for those species. In addition to species protected under federal mandates, NPS policy also requires examination of impacts on state-listed threatened, endangered, candidate, rare, declining, and sensitive species (NPS 2006a). The Texas Parks and Wildlife Department (TPWD) oversees listing of state species. Species listed as endangered or threatened by the state are defined in the same way as federally-listed species. The state also designates species of special concern; however, these species have no legal protection.

Wild and Scenic Rivers Act of 1968

The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 USC 1271 *et seq.*) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. The Act safeguards the special character of these rivers, while also recognizing the potential for their appropriate use and development.

Rivers may be designated by Congress or, if certain requirements are met, the Secretary of the Interior. Each river is administered by either a federal or state agency. Designated segments need not include the

entire river and may include tributaries. Each designated river is administered with the goal of protecting and enhancing the outstandingly remarkable values that caused it to be designated. Designation neither prohibits development nor gives the federal government control over private property. Recreation, agricultural practices, residential development, and other uses may continue. Protection of the river is provided through voluntary stewardship by landowners and river users and through regulation and programs of federal, state, local, or tribal governments.

Within Big Bend National Park, the Rio Grande has been designated as a WSR, and the park is entrusted to protect and enhance the outstandingly remarkable values of the river.

Executive Order 11988: Floodplain Management of 1977

EO 11988 *Floodplain Management*, enacted by then president Jimmy Carter in 1977, requires the NPS and other federal agencies to avoid to the extent possible the short- and long-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. Under the EO, each agency shall provide leadership and shall take action to reduce the risk of flood loss; to minimize the impact of floods on human safety, health, and welfare; and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities.

NATIONAL PARK SERVICE DIRECTIVES AND DIRECTOR'S ORDERS

Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision Making and Handbook

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

National Park Service Management Policies

NPS *Management Policies 2006* (NPS 2006a) state the “fundamental purpose” of the national park system is to conserve park resources and values and to provide for the public enjoyment of the parks resources and values so resources will be left unimpaired for future generations. The specific management policies relevant to this EA and identified in NPS *Management Policies 2006* are as follows:

- **Natural Resource Management** – Section 6.3.7 states the NPS will manage natural resources in the context of the whole ecosystem and will be guided by a coordinated program, scientific inventory, and monitoring and research.
- **Floodplains** – Section 4.6.4 states in managing floodplains on park lands, the NPS will (1) manage for the preservation of floodplain values; (2) minimize potentially hazardous conditions associated with flooding; and (3) comply with the NPS *Organic Act* and all other federal laws and executive orders related to the management of activities in flood-prone areas, including EO 11988, NEPA, applicable provisions of the *Clean Water Act*, and the *Rivers and Harbors Appropriation Act of 1899*.
- **Wild and Scenic Rivers** – Section 4.3.4 states parks containing one or more river segments listed in the NPS *National Rivers Inventory* or with characteristics that might make them eligible for the National Wild and Scenic Rivers System, will comply with section 5(d)(1) of the *Wild and Scenic*

Rivers Act (16 USC 1276(d)(1)). No management actions may be taken that could adversely affect values qualifying a river for inclusion in the National Wild and Scenic Rivers System.

- **Threatened and Endangered Species** – Section 4.4.2.3 states the NPS will survey for, protect, and strive to recover all species native to national park system units listed under the *Endangered Species Act*. The NPS will fully meet its obligations under the NPS *Organic Act* and the *Endangered Species Act* to proactively conserve listed species and prevent detrimental effects on these species. The NPS will cooperate with U.S. Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration fisheries and other agencies, as well as undertake active management programs to inventory, monitor, restore, and maintain listed species habitats, while managing and restoring critical habitat.

IMPAIRMENT

Section 1.4.5 of NPS *Management Policies 2006* states an action constitutes an impairment when an impact “would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values” (NPS 2006a). Whether an impact satisfies this definition depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question in relation to other projects within the park and immediate vicinity. An impact on any park resource or value may constitute impairment; however, an impact would be more likely to constitute impairment to the extent it affects a resource or value whose purpose or conversation is one of the following:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- Key to the natural or cultural integrity of the park or to the opportunity for enjoyment of the park; and/or
- Identified as a goal in the park general management plan or other relevant NPS planning documents.

Impairment findings are not necessary for visitor experience, park health and safety, park operations and management, or socioeconomics because as they relate specifically to park resources and values (these impact areas are not generally considered park resources or values according to the *Organic Act*) and cannot be impaired the same way an action can impair park resources and values. A draft impairment determination for the NPS preferred alternative is provided in appendix A.

SCOPING PROCESS AND PUBLIC PARTICIPATION

NEPA regulations require an “early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action.” Meetings with park staff were conducted to determine the scope of issues to be analyzed in depth in this EA. A newsletter was sent to interested individuals, businesses, and stakeholder groups, and made publicly available on the NPS planning website. The public was given a 30-day period to provide comments and concerns regarding the proposed project.

INTERNAL AND AGENCY SCOPING

An internal scoping meeting was held on January 12, 2011, with involved park personnel to review the purpose and need for the project, identify objectives, review potential issues and impact topics, and

identify preliminary alternatives. During this time, coordination and consultation with other state and federal agencies was also discussed. Consultation with the USFWS will be conducted because federally-listed threatened and endangered species are present in the study area. Consultation will also be conducted with the Texas Historic Commission and affiliated and interested American Indian tribes to ensure listed or eligible historic properties and cultural resources are not adversely affected. The results of agency and tribal scoping will be discussed in the NPS decision document for this project – a Finding of No Significant Impact (FONSI).

PUBLIC SCOPING

The NPS initiated public scoping for the Boquillas crossing EA by issuing a scoping brochure on February 15, 2011. The brochure was sent to a mailing list consisting of 104 recipients and was posted to the park Planning, Environment, and Public Comment (PEPC) Web site at <http://parkplanning.nps.gov/bibe/>. The brochure described the EA process and the preliminary purpose, need, objectives, and alternatives that were developed by the park during internal scoping. In accordance with NEPA and *Director's Order 12* (NPS 2001), the issuance of the scoping brochure began the minimum 30-day requirement for public comment. The public scoping comment period began on February 15, 2011 and concluded on March 16, 2011.

The NPS provided several methods for the public to provide input on the proposed project during the public comment period. The public was encouraged to submit comments directly to the NPS PEPC web site at <http://parkplanning.nps.gov/bibe/>. People could also mail comments to the park if they did not have access to a computer.

During the comment period, 59 pieces of correspondence were received. All but two comments were in support of the proposed project. Those who oppose the proposed project cited cost and security reasons (both of which will be addressed in this EA).

CHAPTER 2: THE ALTERNATIVES

This chapter describes the proposed action alternative developed to meet the purpose, need, and objectives described in “Chapter 1: Purpose of and Need for Action.” It describes the continuation of current management policies, or the no action alternative, which is included to serve as a baseline against which to measure the impacts of the proposed action. The chapter identifies alternatives or actions that were considered during project development but eliminated from further consideration because they failed to meet project objectives or could have resulted in unintended consequences. This chapter identifies the preferred alternative and environmentally preferred alternative, and provides tables summarizing important features of project alternatives, their effectiveness in meeting identified project objectives, and the effects of the alternatives.

ALTERNATIVE A: NO ACTION

The no action alternative is defined as the continuation of current policies and management actions regarding passage across the Rio Grande at the Boquillas crossing. Under alternative A, the Rio Grande border crossing between the United States and Mexico at Boquillas would remain closed. As described in “Chapter 1: Purpose of and Need for Action,” the closure (implemented in May 2002 in the aftermath of the events of September 11, 2001) effectively eliminated interactions between the two nations and local communities at this site. Figure 8 shows the road previously used to access the crossing and signage indicating its closure. At present, the proposed project area is not currently considered a high visitor use area and the gate along the existing dirt road would continue to restrict vehicular access to the site. The continuation of current management policies would not provide visitor services, amenities, or interpretive information near the proposed project site. The road leading to the historic crossing would remain closed.



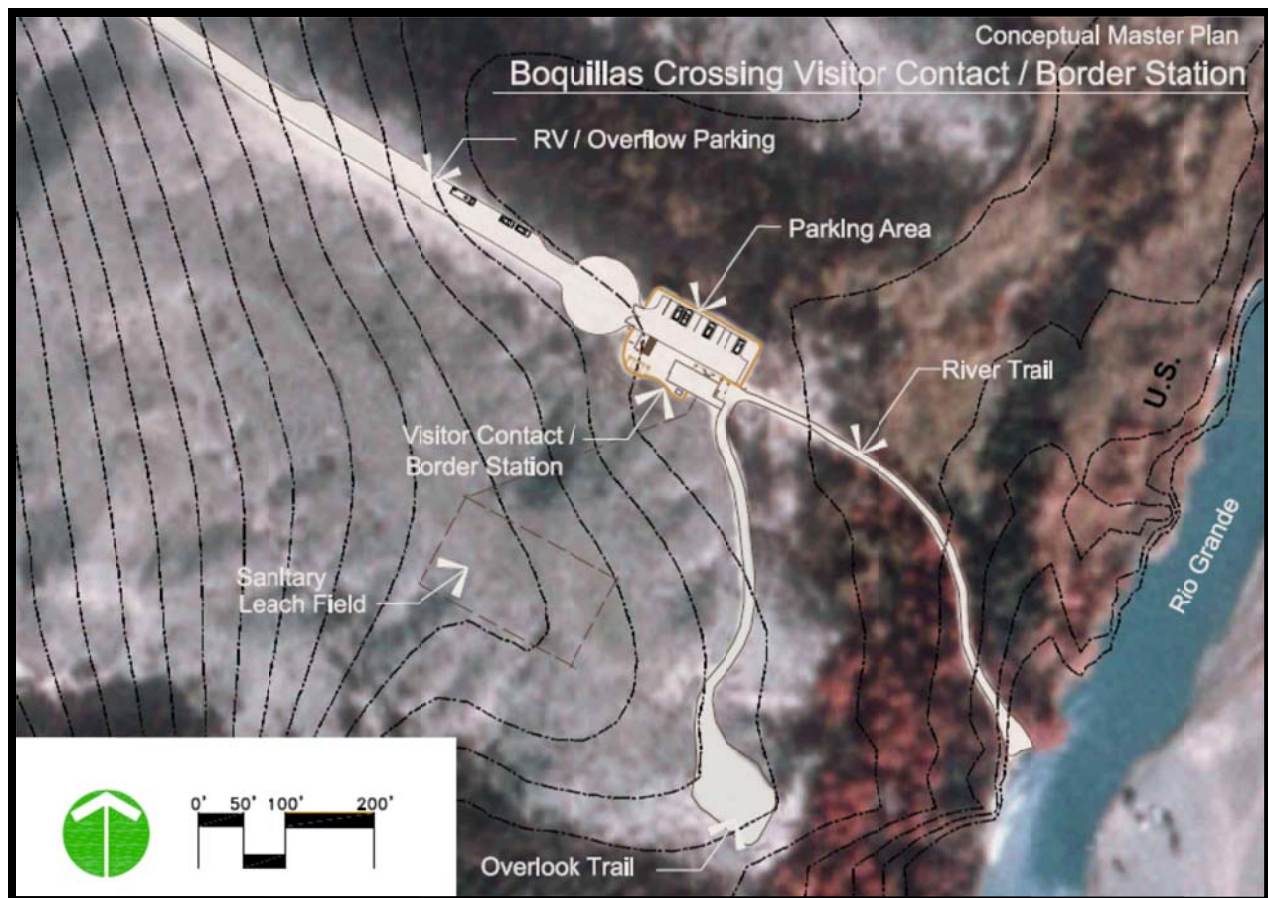
Source: NPS 2011a.

FIGURE 8. ACCESS ROAD AND SIGNAGE INDICATING ROAD CLOSURE

ALTERNATIVE B: THE PREFERRED ALTERNATIVE

Alternative B was developed to address the purpose, need, and objectives identified in “Chapter 1: Purpose of and Need for Action.” During the development of design concepts and siting locations, an evaluation of the traditional crossing site before the border closure in 2002, the siting of new utilities needed to operate the visitor contact station, and a review of previously disturbed areas were considered and are further discussed in this section.

Design concepts ranged from a single building to house visitor services and POE requirements to a single pre-manufactured modular building to the use of existing buildings in nearby Rio Grande Village. Varying floor plans were designed for each concept. The chosen design, as discussed in greater detail below, was selected because it best meets the needs of the NPS and DHS and is within the defined project budget. This design most appropriately creates opportunities to interpret sustainable features, to minimize energy needs, to maximize the sustainable approach to energy conservation and alternative energy, and to separate lobby and visitor flow needs. Figure 9 demonstrates the conceptual master plan for the proposed project in relation to the Rio Grande and historic Boquillas crossing.



Source: NPS 2011a.

FIGURE 9. CONCEPTUAL MASTER PLAN FOR THE PROPOSED PROJECT

An area of approximately 20,000 square feet (sq. ft.) would be used during construction activities associated with this alternative. The majority of this land is previously disturbed and would therefore

avoid significant alteration of the landscape and nearby ecosystem. A smaller area would be necessary for the operation of the proposed project.

The visitor contact station, Class B POE, and associated facilities would be located in two adjacent buildings totaling approximately 1,620 sq. ft. The first building would house visitor services, including the Class B POE. The building was designed to accommodate a lobby, staff area, two document scanning kiosk areas, and two support rooms for a local area network and mechanical/electrical equipment. The second building would house restroom facilities and a utility room. Both buildings would meet LEED Silver sustainability plus requirements. Renderings of the proposed visitor contact station are shown in figure 10.



Source: NPS 2011a.

FIGURE 10. RENDERINGS OF THE PROPOSED VISITOR CONTACT STATION

The proposed project was designed to be architecturally compatible with the Barker Lodge, located within close proximity to the project site. Both buildings use concrete block and engineered wood beams as the major shell component. A shade trellis structure of approximately 845 sq. ft. connects the two buildings.

Construction of the visitor contact station is proposed to begin in July 2011. The POE opening is proposed for the end of March 2012. Construction activities for all components of the proposed project are estimated at \$2.28 million in 2011 dollars. Four percent inflation has been added to construction activities in 2012. Life cycle costs, which include initial costs of construction, repair and replacement costs for the 50-year useful life cycle of the facility, and any annual operating or maintenance costs, are estimated at \$3.91 million in 2011 dollars. Traditional methods, wading and boating, used to cross the river would be permitted at the crossing. Driving across the river would not be permitted as it had been before the closure.

SITE ACCESS AND PARKING

The visitor contact station would be accessed from the main park road via an unpaved road, which is located approximately 1.3 miles east of the junction at Rio Grande Village. The unpaved road, which is currently used by park staff as an access road to the river and is approximately 350 yards long, would be graded and a new gravel surface would be applied. The road is currently closed to visitor vehicular traffic.

A new gravel turnaround would be sited at the end of the driveway just outside the entrance gate of the proposed visitor contact station. The existing gravel driveway would be widened along the north side of the road at this location to allow space for up to eight cars and three recreational vehicles or buses. The turnaround and driveway widening will be completed by the NPS and are considered in the cost estimate for the proposed project.

The improved gravel parking area within the perimeter site wall provides space for nine passenger vehicles and an additional asphalt parking space and associated access aisle would be paved to provide access for those visitors protected under the Americans with Disabilities Act (ADA). Secure bicycle parking would also be provided adjacent to the restroom.

VISITOR CONTACT STATION

The visitor contact station would be sited approximately 500 feet from the banks of the Rio Grande, behind a small hill with an elevation change of 30 feet to 40 feet. The site was selected to avoid significant fills on the east side of the site. The proposed project includes two adjacent buildings – one to house visitor services, including the Class B POE, and the other to house restroom facilities and a utility room. Both buildings would meet LEED Silver sustainability plus requirements.

The visitor services building was designed to accommodate a lobby, staff area, two document scanning kiosk areas, and two support rooms for a local area network and mechanical/electrical equipment. It would include features such as park information, maps, interpretive and educational information, restrooms, a waiting area, drinking fountains, and a freezer on site for storage of plant material and agricultural products brought across the international border. Surrendered goods would be retrieved by DHS agents for disposal. Interpretative and educational information would include an overview of the geological features developed over time and peoples who have inhabited the area over the past few thousand years.

As demonstrated in figure 11, to ensure consistency in the built environment along this section of the river, the visitor contact station would be architecturally similar (adobe-style architecture) to the Barker House, overlooking the Rio Grande just east of the proposed project area. Additionally, the building including the façade would be constructed with materials that are compatible with the nearby Barker House. The structure would be LEED Silver sustainability plus certified, which is consistent with the NPS mandate to conserve energy and resources.

The park is open year-round, 24 hours a day. The proposed hours of operation of the Class B POE would be primarily limited to daylight hours, approximately 8:00 a.m. until 6:00 p.m. daily. Hours of the NPS-operated visitor contact station would generally follow the hours the POE is open. Visitors entering Mexico could speak with NPS staff in the facility to ensure they have information pertaining to the river crossing and visitor opportunities in Boquillas and surrounding areas. Visitors could also speak with NPS staff about the types and quantity of goods permitted when reentering the United States. Those entering the U.S. would be required to relinquish foodstuffs before passing into the park. Such goods would be stored in the freezer on-site until DHS agents retrieved it for disposal.



Source: NPS 2011a.

FIGURE 11. VISITOR CONTACT STATION CONCEPT PLAN

CLASS B PORT OF ENTRY

The CBP would designate the Boquillas crossing as a remote, automated POE. The POE would be located in the visitor contact station. Those visitors entering the United States via the Boquillas crossing would be required to show proper documentation for verification at the kiosks before entering the park. A 24-hour surveillance camera would be installed to monitor activity at the Boquillas crossing.

All specialized equipment to support the POE would be furnished and installed by the CBP upon completion of construction activities. The equipment and technology required by CBP would be housed in this building and monitored by CBP agents at other locations. CBP staff would interact remotely with those entering the United States to ensure proper documentation. Because the site would be a remote, automated POE, no CBP personnel would be located on site. However, NPS staff at the site would provide information on international crossing legal requirements, how to use the remote POE, logistics associated with the boat vendors, and activities/sites available within the Mexican protected areas and the town of Boquillas, Mexico. This would be the last location within the park for boaters to pull out of the river prior to entering the Boquillas Canyon. Using this site as a put-in would make the Boquillas Canyon trip a day shorter.

RIO GRANDE ACCESS AND CROSSING

Grading and adding a layer of gravel would stabilize the existing trail from the visitor contact station to the river. The width of the trail would decrease from approximately 12 feet to approximately 6 feet. Trimming of trees and clearing giant reeds would improve visibility of the trail from the river. However, most vegetation would be retained to provide shade cover, as would mature trees that form a shade canopy along the access trail.

At the base of the trail, a shade structure made would be installed to provide a respite from the summer sun. This type of shade canopy would be consistent with the historic ambience of the site, but would not

be designed to withstand flooding and would be replaced if it were removed by high flows. Temporary, mobile, walking surfaces (e.g., Mister Boardwalk[®]) would be used along the river to provide sound footing for those visiting or crossing the riverbank when conditions are muddy. The use of such walking surfaces would also reduce the potential for erosion along the riverbank. At the edge of river, the degraded riprap associated with the remnants of the truck and vehicle crossing when the border was open would be removed.

At the river's edge, the degraded riprap associated with the remnants of the truck and vehicle crossing used when the border was open before May 2002 would be removed. Use of heavy equipment during the removal of the riprap would be required to lift the boulders and concrete from the riverbank. This material would be relocated and retained at the maintenance storage area for future use in park projects.

Boating and wading across the river would be permitted. At this time, the use of burros and other livestock has not been approved for passage across the river. Given the depth and distance across the river at this location, it is anticipated that non-motorized boats would be used to ferry people across the river.

RIVER OVERLOOK AND TRAIL

The existing gravel overlook driveway has been converted to a pedestrian only trail. Visitors would access this trail along with the trail to the river crossing by entering the proposed visitor contact station and exiting towards the east. The trail would follow a former road bed; therefore, no new land disturbance would be needed. The river trail connection and overlook trail improvements would be completed as a separate NPS project. An interpretive sign, displaying the history of the Boquillas area, would be installed along the trail.

UTILITIES

An overview of existing and anticipated utilities at the proposed project site is provided below. This includes electricity, potable water, and wastewater service.

Electrical Services

The main electrical service is 120Y/208 volt, 3 phase, 4 wire. The main electrical service entry point is a 200-amp fused disconnect in a service rated enclosure located in the electrical room. This would feed a 60-KW UPS power conditioner to avoid short power interruptions or changes to power quality caused from being at the end of the utility's power line service. A 200A branch panel located in the electrical room would serve the main building mechanical equipment, lighting, and convenience power. A 100A branch panel would be located in the local area network room to provide power to the equipment and receptacles in that room. A 100A serve rated branch panel with integral 100A circuit breaker disconnect would be located in the building with the restrooms' janitor room to serve mechanical equipment, lighting, and convenience power in that building.

Potable Water Service

Potable water service to the proposed project site would be provided by connecting to the existing water system in Rio Grande Village. To achieve this, several improvements are necessary including connecting the existing service line at Berkley Cottage to the existing service line, installing a chlorine booster station in a prefabricated building near Berkley Cottage, installing a new water service line connecting the existing line to the proposed project site, and installing a water meter on the service line. A description of each component is provided below.

Water System Connections – An existing 2-inch service line runs from the water system at Rio Grande Village to a residence near Berkley Cottage. Near the terminus of this 2-inch service line, a recently installed 1.5-inch line begins which extends northeast the Deep Fault Well. The new waterline segment which connects these existing service lines also needs to connect to a chlorine booster station that would be installed as part of this project near Berkley Cottage. It is anticipated that connecting the existing 1.5-inch line, the chlorine booster, and the existing 2-inch would require several fittings (reducers, valve, bends), and a nominal length of buried pipe. It is anticipated that such pipe would total less than 100 feet.

Chlorine Booster Station – Due to low chlorine residual concentrations near Berkley Cottage, a chlorine booster station would be required to maintain free-chlorine residual levels of 0.2 mg/liter at the proposed visitor contact station. This is compliant with the Groundwater Rule administered by the Texas Commission on Environmental Quality. Installation of this booster station adjacent to the Berkley Cottage would ensure that adequate chlorine contact time is achieved between the re-chlorination point and the proposed visitor contact station. The chlorination booster station would require a small enclosed utility building approximately 8 feet by 10 feet which could be a pre-fabricated building. Power for the booster station could be drawn from an existing service line that runs to Berkley Cottage. Additionally, the booster station would be designed to accommodate a future water booster pump to increase system pressure if needed at a future date.

New 2-inch Service Line – To convey potable water from the chlorine booster station to the proposed contact visitor station, a new pipe segment of 2,600 feet would be required. Based on a peak flow demand of 15 gallons per minute estimated for the proposed visitor contact station, the use of a 2-inch diameter pipe would ensure that such flows could be delivered to the site. It is anticipated that this pipe would be Schedule 80 PVC which is consistent with the recently installed segment of 1.5-inch diameter pipe.

New Water Meter – A water meter would need to be installed outside the proposed visitor contact station in order to comply with NPS policy with respect to project sustainability.

Wastewater Service

Waste water discharged from the proposed visitor contact station would be managed using a septic system, consisting of a septic tank, a pump chamber, and a leach/drainfield.

Septic Tank – The wastewater collection piping installed as part of the proposed project would drain to a septic tank located adjacent to the visitor contact station. Based on daily a daily wastewater usage rate of 600 gallons per day, a 1,500 gallon 2-compartment tank is anticipated to be sufficient for the proposed project.¹

Pump Chamber – Because the proposed drainfield site is located at a higher elevation than the septic tank, effluent pumps would be needed to utilize a pressurized distribution system. Timer controlled dual effluent pumps would be housed in a 1,000 gallon concrete chamber located downstream of the septic tank. The primary pump would engage once an adequate amount of wastewater effluent has accumulated in the pump chamber to trigger the float valve. The pump switch-gear would be set as such that each pump operates as the first pump on an alternating basis. When engaged, the effluent pumps would convey wastewater to the drainfield, located approximately 350 feet west of the proposed visitor contact station

¹ This assumes 75 visitors per day at eight gallons of effluent per visitor. Such visitation would be on the high end of what is estimated for the proposed project.

via a 2-inch diameter pipe. Due to the drainfields location above the pump tank, a check valve would be installed in the sewage effluent line.

Drainfield – The proposed drainfield site would be located approximately 350 feet west of the visitor contact station. The proposed bed drainfield would be 64 feet long x 31 feet wide x 5 feet deep. Seven rows of 4-foot leaching chambers (15 chambers per row, 105 chambers in total) would be used for effluent infiltration. Rows would be set on 4 foot centers with each row of chambers connected by a level, 4-inch schedule 40 PVC header at both ends of the drainfield to provide a looped system. The required area for the drainfield was determined using a loading rate of 600 gallons per day and a long term application of 0.38, which necessitates 1,580 sq. ft. of absorption area. The 105 leaching chambers would provide an absorptive area of 1,620 sq. ft. Native non-woody vegetation would then be allowed to reestablish on the site.

Stormwater Conveyance System

The stormwater management strategy for the proposed project includes harvesting rainwater from rooftops for irrigation, utilizing infiltration and dispersion for concentrated stormwater flows, and mimicking the natural hydrology by allowing runoff from the parking area to sheetflow offsite. Stormwater that is concentrated in the ditch that runs along the southwest side of the project site would enter a ditch inlet and 18-inch ductile iron pipe which would convey stormwater beneath the entrance road. The pipe would be approximately 70 feet in length and would discharge to a small depression underlain by a 4-foot thick section of drain rock for infiltration. During large storm events, the depression would overflow to a riprap channel section for energy dissipation prior to draining offsite. To manage onsite stormwater that is not harvested for irrigation use, the parking area would be sloped to the northeast to allow stormwater runoff to sheet flow through scuppers placed along the northeast wall. Stormwater flowing offsite in this manner would be discharged to the vegetated area on the northeast side of the site.

LANDSCAPING

All landscape plantings would be native species adapted to the Chihuahuan Desert landscape. Planting areas would be surfaced with decomposed granite providing for a more refined and maintainable surface. The plantings would include some small native trees to provide additional shading of the building and hardscape areas. Irrigation would be provided to the new plant material through a drip irrigation system. This system can be operated via a domestic water connection, but more often by a rainwater harvesting tank capturing building roof runoff to be used for irrigation.

SITE PREPARATION AND GRADING

The location of the proposed visitor contact station required grading into the existing hilltop. This site was selected because it would avoid significant fills on the east side of the site. The ground would be graded to slope away from the building on the west side and a drainage ditch would be installed to collect water from the hillslope. The parking area would be sloped to the northeast to allow stormwater runoff to sheet flow through scuppers placed along the northeast wall.

CONSTRUCTION EQUIPMENT AND MATERIALS STAGING AND STORAGE

The proposed project area, existing road, trail, and much of the utility routes have been previously disturbed. The parking area and site of the visitor contact station are graded and gravel-topped, having been in this condition since at least the 1950s. These areas would provide adequate space for staging or storing equipment, construction supplies, and soil and fill materials during the construction period. No new disturbance would be generated to meet the staging and storage needs of the project. It is anticipated

that excavated material would be used as on-site fill or deposited in areas adjacent to the proposed project site.

RESOURCE PROTECTION MEASURES

Under the preferred alternative, best management practices and resource protection measures would be used to prevent or minimize potential adverse effects associated with the proposed project. These practices and measures would be incorporated into project construction documents and plans.

Resource protection measures undertaken during project implementation would include, but would not be limited to, those listed in table 2. The impact analyses presented in “Chapter 4: Environmental Consequences” were performed assuming best management practices and mitigation measures would be implemented.

TABLE 2. RESOURCE PROTECTION MEASURES OF THE PREFERRED ALTERNATIVE

Resource Category/Action	Responsible Party
Public Health and Safety	
An accident prevention plan, which would include job hazard analyses associated with construction of the proposed project, would be required. The plan would address: <ul style="list-style-type: none"> • Fires • Power outages • Rain • Windstorms • Nature of the construction work • Site conditions • Required project inspections and safety meetings. 	Construction Contractor
Visitor safety would be ensured day and night by fencing of the construction limits of the proposed project, including the walking trail. Appropriate barriers would be established at the entry road access off the main highway. Because the Boquillas crossing is currently closed, it is not anticipated visitors would be frequenting areas near the proposed project site.	Construction Contractor
All trucks hauling construction materials, demolition debris and other loose materials that could spill onto paved surfaces would be covered or would maintain adequate freeboard.	Construction Contractor
Visitor Experience	
Specific provisions would be followed, to minimize adverse effects on visitors: <ul style="list-style-type: none"> • The majority of material deliveries would be made and disruptive work would be done during the week, rather than on weekends or holidays, and early morning or late evening construction work would be encouraged (i.e., before and after peak visitation periods) • The contractor would be encouraged to deliver the majority of materials in the early morning hours (before 10:00 a.m.) • Paved areas used for vehicular and pedestrian movements would be kept clean of construction debris and soils, as necessary. 	Construction Contractor
Information about construction activities would be made available at visitor centers inside and outside the park.	NPS

Resource Category/Action	Responsible Party
Cultural Resources – Archeology, Historic Structures, and Cultural Landscapes	
<p>A meeting would be held with the park archeologist to discuss area historic resources, clarify construction schedules, and establish a plan for archeological monitoring of ground-disturbing site work, including:</p> <ul style="list-style-type: none"> • Clearing • Topsoil removal • Trench excavation • Landscaping • Construction of facilities. <p>However, because much of the area was previously disturbed, it is not anticipated such resources would be encountered during construction of the proposed project.</p>	NPS and Construction Contractor
<p>If prehistoric or historic archeological resources are discovered at any time during the construction of the proposed project, work in the area associated with the find would cease until evaluated by the park archeologist or designated representative, and procedures outlined in 36 CFR 800 would be followed, potentially including relocation of the work to a non-sensitive area to avoid further disturbance to the site until the significance of the find can be evaluated.</p>	NPS and Construction Contractor
<p>Discovered resources would be evaluated for their potential National Register of Historic Places significance, and, if needed, mitigation measures would be developed in consultation with the Texas State Historic Preservation Officer. Mitigation measures would be cognizant of resource significance and preservation needs, and could include such provisions as changes in project design and/or archeological monitoring of the project and data recovery conducted by an archeologist meeting Secretary of the Interior standards.</p>	NPS
<p>To reduce unauthorized collecting from areas,</p> <ul style="list-style-type: none"> • Construction personnel would be educated about the need to protect any cultural resources encountered • Work crews would be instructed of the illegality of collecting artifacts on federal lands (<i>Archeological Resources Protection Act</i>) • In advance of ground disturbing activities, instructions would be given regarding respectful treatment of human remains, and notification of the appropriate personnel in the event such remains are discovered. 	NPS and Construction Contractor
<p>To minimize ground disturbance, all staging areas, materials stockpiling, vehicle storage, batch plant(s), and other construction-related facilities and areas would be located in a previously disturbed area or on hardened surfaces.</p>	NPS and Construction Contractor
<p>If park staff find it necessary to revegetate disturbed upland areas, such efforts would include:</p> <ul style="list-style-type: none"> • Use of native plants • Modern techniques that create sustainable trail and landscape designs compatible with the historic architectural style of the Barker House • Stockpiling and reuse of existing materials. 	NPS and Construction Contractor
Wildlife, including Threatened and Endangered Species	
<p>Construction workers would be educated about:</p> <ul style="list-style-type: none"> • The dangers of intentional or unintentional feeding of park wildlife • Inadvertent harassment through observation or intentional pursuit • The need for workers to remain within the construction staging area. 	NPS

Resource Category/Action	Responsible Party
Night Sky	
NPS Night Sky policy applies to this project and would be enforced during construction activities.	NPS
Night lighting would be minimized during and after construction. Where night lighting is necessary, lighting would be designed as minimal, directed downward, and shielded.	Construction Contractor
Air Quality	
<p>To the degree possible, impacts to air quality would be mitigated by:</p> <ul style="list-style-type: none"> • Reducing vehicle emissions by keeping equipment properly tuned and maintained in accordance with manufacturers' specifications, and not allowing engines to idle • Use of best management practices (BMPs) to reduce generation of dust • Limiting the types of chemicals (low volatile organic compound ratings) used in new construction and rehabilitation work • Reducing trip generation by encouraging carpooling and shipment of full loads only. 	Construction Contractor
Any treated wood would comply with standard conditions approved by the Western Wood Preservers Institute that minimize impacts on air quality (currently only wood treated with alkaline copper quaternary ammonium compound is approved for NPS projects).	Construction Contractor
Natural Soundscape	
To the extent possible, all on-site noisy construction work above 76 A-weighted decibels (dBA) (such as the operation of heavy equipment) would be done during daylight hours.	Construction Contractor
<p>Standard noise abatement measures would include the following elements:</p> <ul style="list-style-type: none"> • All construction equipment would be equipped with mufflers kept in proper operating conditions • Equipment would be shut off rather than allowed to idle • Scheduling would be designed to minimize impacts on adjacent noise-sensitive areas • Use of hydraulically or electrically powered impact tools when feasible • Location of stationary noise sources as far from sensitive public use areas as possible. 	Construction Contractor
Soils and Vegetation	
<p>To minimize the disturbance of soils and vegetation in the construction staging area, particularly those lands where the proposed project would be sited, the following mitigation measures will be implemented:</p> <ul style="list-style-type: none"> • All mature trees identified for removal would be flagged before the start of construction, in consultation with a park plant ecologist and/or historical landscape architect • Construction limits would be fenced before beginning any work under the proposed contract until completion of the contract to ensure no additional disturbance from construction activities would result. 	NPS and Construction Contractor
<p>To protect the viability of the vegetation in the project area, the following measures would be taken:</p> <ul style="list-style-type: none"> • Excavated fill or disturbed soils would be tamped back into place • Imported soils and other materials (including quarry rock or straw bales) would be certified weed free and are subject to inspection • Erosion control would be in the form of sterile matting, to preclude introduction of nonnative species. 	NPS and Construction Contractor

Resource Category/Action	Responsible Party
Water Resources and Wetlands	
To prevent soil from eroding and depositing into water sources: <ul style="list-style-type: none"> • Any stored topsoil or fill material would be surrounded by silt fencing and overtopped by semipermeable matting anchored together to prevent siltation from heavy runoff during rainstorms • Adequate erosion control or drainage structures would be installed and maintained • Materials would be stockpiled in areas exhibiting signs of disturbance (bare ground or fill material). 	Construction Contractor
An adequate hydrocarbon spill containment system would be available on site in case of unexpected spills in the project area.	Construction Contractor

ALTERNATIVES OR ACTIONS ELIMINATED FROM FURTHER STUDY

Several alternatives or actions, suggested by other agencies or the public, were not examined in this EA as their inclusion falls outside of the scope of this project. Consistent with Section 1502.14 of CEQ (1978) regulations for implementing NEPA, this section identifies those alternatives or proposed alternative elements and the reasons why they were eliminated from further analysis.

USE OF THE BARKER HOUSE

This component of the action alternative proposed the use of the Barker House as the site of the contact visitor station. This component of the action alternative was dismissed because of challenges associated with the topography between the proposed project site and the Rio Grande, which includes a steep riverbank not suitable for crossing. This site is located at an increased distance from exiting utilities and necessary services than the proposed project site. The site may also contain archeological resources that would require investigations before construction activities and would result in schedule delays that could jeopardize project deadlines. The proposed project site would create difficult construction conditions, adding cost premiums of approximately 15 to 20 percent and increasing project costs beyond the available budget (NPS 2011b). Lastly, the Barker House is currently used as housing for park law enforcement.

USE OF THE RIO GRANDE VISITOR CENTER

This alternative would use the existing Rio Grande Visitor Center to serve the functions of the proposed visitor contact station and POE. Visitors would be transported by bus to and from the Boquillas crossing. This alternative was dismissed for a variety of reasons. First, there is no available space in the existing visitor center and, if contact or border functions were added, visitor center functions would have to be displaced. Secondly, no operating funds, staff, or bus equipment are available to fulfill this alternative. Lastly, as the Boquillas crossing is located several miles from the Rio Grande Visitor Center, very little monitoring would occur, thereby increasing risk to safety and security.

SITING THE VISITOR CONTACT STATION IN RIO GRANDE VILLAGE

This component was dismissed from further analysis as the visitor contact station would be located too far from the village of Boquillas to serve as an efficient crossing to meet project objectives. Similar to the previous dismissed alternative, the siting of the proposed visitor contact station at this location would also require transportation to the Boquillas crossing. No operating funds, staff, or bus equipment are available to fulfill this alternative. As the Boquillas crossing is located several miles from the Rio Grande Village, very little monitoring would occur, thereby increasing risk to safety and security. Lastly, river access from

the Mexican side of the Rio Grande to this site would be relatively difficult because of rapid elevation change along the river at Rio Grande Village.

USE OF THE BORDER CROSSING FACILITY IN MEXICO

The use of the border crossing facility in Mexico was not evaluated because the United States does not have jurisdiction to conduct such activities outside its borders. Furthermore, existing structures are either located too far from the riverbanks or not near the historic Boquillas crossing.

BRIDGE (PEDESTRIAN OR VEHICULAR) ACROSS THE RIO GRANDE

The Rio Grande near the Boquillas crossing is designated scenic under the WSRA. Such a designation, which protects the scenic values of the river, limits development in the river corridor that that necessary to provide access and support appropriate uses. As a result, the construction and operation of a bridge, either pedestrian or vehicular, was dismissed from further consideration. Additionally, the construction and operation of a bridge would be beyond the financial means of the proposed project and would require the disturbance of nearby areas for installation of access trails and/or roads.

TEMPORARY MEANS TO OPEN BORDER IMMEDIATELY

A means by which to immediately open the border at Boquillas was evaluated. The potential to station a CBP ranger at the Boquillas crossing site during daylight hours during construction of the proposed project was dismissed for safety and security reasons. The operation of the preferred alternative would include installing 24-hour surveillance cameras as part of construction activities. The opening of the border without such surveillance in place could be a safety and security concern. Additionally, the inability to scan documents, access DHS databases, and perform other requirements associated with international crossings prevents the immediate opening of the area.

THE ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is defined as “the alternative that will best promote the national environmental policy expressed in the *National Environmental Policy Act’s* Section 101.” This generally is interpreted as the alternative that causes the fewest adverse effects on physical, biological, and cultural resources. The policy also considers beneficial use of nation resources and providing a high standard of living.

Section 101(b) of NEPA identifies six criteria to help determine the environmentally preferred alternative. The act directs federal actions to:

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- Assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;
- Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
- Preserve important historical, 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 to permit high standards of living and a wide sharing of life amenities; and
- Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

The two alternatives evaluated in this EA differ in their abilities to fulfill these criteria. Overall, alternative B would be the environmentally preferred alternative, as it best meets the NPS mandate to protect resources and values while providing a safe, high-quality visitor experience. Effects associated with each alternative relative to the abovementioned criteria are described below. A more detailed evaluation of impacts is provided in “Chapter 4: Environmental Consequences.”

Criterion 1: Fulfill the Responsibilities of Each Generation as Trustee of the Environment for Succeeding Generations – This criterion would be best met by alternative B, the preferred alternative. The Boquillas crossing would help support joint U.S.–Mexico management goals for a large expanse of Chihuahuan Desert and rugged mountain ranges spanning the Rio Grande. The United States and Mexico have shared resource protection objectives for this area, which are identified in the mission statement of the Big Bend–Rio Bravo Project. The establishment of the Class B POE would facilitate effective crossings in support of these resource protection goals. One example would be experienced by the ability of the park to pursue more readily fire management activities requiring “Los Diablos” from Boquillas, whose services are needed to regulate prescribed fire and associated sustainable resource management goals.

Criterion 2: Assure for All Americans Safe, Healthful, Productive, Esthetically and Culturally Pleasing Surroundings – Criterion 2 would be best met by alternative B, the preferred alternative. Establishing a Class B POE with camera monitoring capabilities would help protect this part of the United States–Mexico international border. Remote technology would be used to maintain security and verify the identity of those entering the United States by ensuring people have appropriate documentation such as passports, visas, and crossing cards. Additionally, NPS staff indicates the formal crossing would improve communications between park rangers, other staff of protected areas and local communities, and infrastructure would help to limit criminal activities along this stretch of the Rio Grande. The ability for park visitors, staff, and researchers to legally pass into Mexico at this location would help restore a historic and culturally significant use of the river. Such passage would facilitate enhance esthetic and cultural opportunities.

Criterion 3: Attain the Widest Range of Beneficial Uses of the Environment without Degradation, Risk to Health or Safety, or Other Undesirable and Unintended Consequences – This criterion would best be met by alternative B, the preferred alternative. Alternative B would facilitate new and enhanced visitor opportunities while 24-hour camera monitoring of the crossing area, installation of a Class B POE, and presence of NPS staff would minimize threats to resources and public safety at the site. Under the no action alternative, parks visitors, staff, and researchers would not be permitted to enter Mexico from this location, minimizing opportunities to enjoy the natural environment to its fullest.

Criterion 4: Preserve Important Historical, Cultural, and Natural Aspects of Our National Heritage, and Maintain, Wherever Possible, an Environment that Supports Diversity and Variety of Individual Choice – Criterion 4 would be best achieved under alternative B, the preferred alternative. Under this alternative, the historic and culturally significant river crossing would be re-opened. Legal passage across the Rio Grande at this location would support the right to choose whether visiting locations in Mexico would contribute to their park experience (a choice not possible under the no action alternative).

Criterion 5: Achieve a Balance between Population and Resource Use to Permit High Standards of Living and a Wide Sharing of Life Amenities – Criterion 5 would best be met by alternative B, the preferred alternative. The preferred alternative would help protect and conserve the fragile desert ecosystem located on either side of the United States–Mexico international boundary. Additionally, this alternative is not anticipated to induce residential development or increase the cost of living for communities in and around the park. However, this alternative is expected to increase visitor patronage to the southernmost portions of the park, such as Rio Grande Village and Boquillas. Such a change in visitation would result in increased spending at local concessionaires within the park and establishments in Boquillas and from local craftspeople. Under the no action alternative, local businesses on either side of the international boundary would continue to experience decreased revenues associated with the border closure, contributing to a decreased standard of living for affected parties. Natural resources on the Mexican side of the international boundary would not be accessible to visitors, staff, or researchers. Because of the border closure, visitors and communities on either side of the international boundary would not facilitate the sharing of life amenities.

Criterion 6: Enhance the Quality of Renewable Resources and Approach the Maximum Attainable Recycling of Depletable Resources – Alternative A, the no action alternative, most appropriately meets this criterion, as it would not require the use of fossil fuels or other depletable resources. Conditions would remain as they are, and the recycling of depletable resources would not be necessary because no such resources would be used. Alternative B, the preferred alternative, would require the use of depletable resources during construction activities associated with the visitor contact station. This would include mined materials used in building materials and fossil fuels to power construction equipment.

HOW THE ALTERNATIVES MEET THE OBJECTIVES

“Chapter 1: Purpose of and Need for Action” identifies the three objectives to be achieved for the selected alternative to be considered a success. Alternatives included for detailed analysis in this EA must meet project objects to a large degree, and resolve the purpose of and need for action. Table 3 summarizes the ability of project alternatives to meet project objectives.

TABLE 3. HOW THE ALTERNATIVES MEET THE OBJECTIVES

Provide Needed Facilities for a Secure, Legal Port of Entry between the United States and Mexico	
Alternative A	There would be no POE under this alternative. The border would remain closed. Therefore, this objective would not be met under this alternative.
Alternative B	The construction and operation of the visitor contact station and Class B POE would provide a secure, legal entry at Boquillas between the United States and Mexico. Alternative B fully meets this objective.
Facilitate International Cooperation in the Management of Areas of Bi-national Interest	
Alternative A	Relevant groups and agencies would continue to coordinate management and research activities as they do under existing conditions. This objective would be partially met under the no action alternative.
Alternative B	International cooperation in the management of areas of bi-national interest would be eased with the reopening of the Boquillas crossing. Alternative B fully meets this objective.
Enhance Opportunities for Visitor Understanding of Historical Uses, Travel Requirements, Socioeconomics, and Sustainable Use	
Alternative A	There would be no change in visitor use and experience as no new interpretive programs would be offered. As the Boquillas crossing would remain closed under this alternative, current travel requirements would not change. Economic activity in Boquillas and at the

	park concessionaire and surrounding around would continue as under existing conditions because visitation is not anticipated to change notably. There would be no sustainable use of the proposed project area under this alternative. Therefore, this objective would not be met under this alternative.
Alternative B	The visitor contact station would provide new interpretive opportunities for visitors to understand historical uses and significance of the Boquillas crossing and the park. Park staff would provide information on international crossing legal requirements and other relevant knowledge about travel requirements. Maps, brochures, and face-to-face delivery of this information would be available. Park visitors and Boquillas residents would have the opportunity to engage in historic economic activities in the area. The proposed project would be designed to meet LEED sustainability criteria. Alternative B fully meets this objective.

“Chapter 4: Environmental Consequences” provides a detailed discussion of potential impacts associated with the action and no action alternatives. A summarize of impacts of the alternatives on the natural and human environment by resource topic are presented in table 4.

TABLE 4. SUMMARY OF IMPACTS OF THE ALTERNATIVES

Visitor Use and Experience	
Alternative A	Certain visitor activities would not be possible under this alternative. The inability to participate in such activities could affect overall visitation numbers. Long-term, minor to moderate impacts to visitor use and experience would result.
Alternative B	This alternative would enhance the visitor experience in the park through increased visitor opportunities and interpretative programs. This alternative would result in long-term beneficial impacts to visitor use and experience.
Socioeconomics and Transboundary Conditions	
Alternative A	The park concessionaire and Boquillas merchants would continue to experience a loss in revenue attributable to park visitors who previously visited the Boquillas crossing. Boquillas residents would not be able to purchase goods and services from the park concessionaire, which before the border closure, attributed to approximately 40 percent of park concessionaire revenue.
Alternative B	The long-respected relationship between communities on either side of the river at Boquillas would be restored and historic social and economic interaction between and among peoples would be rejuvenated. Long-term, beneficial economic and social impacts to individuals and communities on either side of the border would result.
Public Health and Safety	
Alternative A	There would be no change in public health and safety over existing conditions.
Alternative B	Increased law enforcement and 24-hour video surveillance of the proposed project area would result in long-term, beneficial impacts to public health and safety.
Park Operations and Management	
Alternative A	There would be no change to park operations and management under this alternative.
Alternative B	The increase in law enforcement and interpretive services would result in long-term, beneficial impacts to park operations and management.
Floodplains	
Alternative A	No alteration to floodplains or floodplain functions would occur under this alternative.

Alternative B	The construction of the visitor contact station and associated utilities including rainwater and propane tanks could inhibit, somewhat, the ability of the site to disperse flood flows and energy, and floodplains functions of the site would be altered. The use of silt fencing protects the project area from soil erosion and sediment control and when combined with the relatively small size of the proposed visitor contact station, its proposed location on the edge of the 100-year floodplain, and anticipated rare occurrence of flows reaching the site, the result of construction would be long-term negligible and adverse. At the boundary of the 100-year floodplain, flow volumes and speeds would be low, and there would be limited potential for the structure to exacerbate upstream or downstream ponding or other flood characteristics. The presence of the visitor contact station would have long-term, localized, negligible adverse impacts on floodplain functions and values.
Wild and Scenic Rivers	
Alternative A	No alteration would occur to the outstandingly remarkable scenic characteristics that contribute to classification of the study area as a Wild and Scenic River. The riprap previously used to support automobile crossings during low water flows would remain in place resulting in site-specific, long-term, negligible to minor adverse impacts on WSR values.
Alternative B	Designed to be architecturally compatible, the proposed visitor contact station would have long-term negligible adverse impacts on scenic qualities. Trimming of existing vegetation and construction of a shade structure would have long-term negligible adverse impacts. Increased vehicular traffic has the potential to have long-term negligible to minor adverse impacts. Beneficial impacts to scenic values occur with the removal of existing riprap, trail width reduction and cultural appeal of reverting to the historical use of the site.
Water Resources	
Alternative A	There would be no alteration to and/or demand for water resources. Current water quality conditions would continue resulting in no effect on water resources.
Alternative B	Construction activities would have short-term, negligible adverse impacts on water resources from increased water use. Increased visitor use of the site, would place additional demands on existing water supply, however, when mixed with water conservation features of the proposed visitor contact station and other efforts within the park demand would not exceed historic rates resulting in no measureable effect.
Soils and Vegetation	
Alternative A	No new disturbance to soil would occur. The existing riprap along the river would remain allowing continued erosion and deposition resulting in site-specific, long-term, minor, and adverse impacts. Natural vegetation in the project area would remain undisturbed by human activity and previously disturbed and damaged vegetative communities would have the opportunity to recover resulting in long-term beneficial impacts.
Alternative B	Impacts would be limited to soils in previously disturbed areas resulting in long-term negligible adverse impacts. The construction of the leach field, septic tank, and small portion of the water line on undisturbed soils results in long-term minor adverse impacts. However, native vegetation would grow over the drainfield once construction activities are complete. Beneficial impacts to soils occur with the removal of the existing riprap.
Wildlife, including Special-status Species	
Alternative A	There would be no effect on wildlife and wildlife habitat, including federally- and state-listed species, because no new disturbance would be introduced.
Alternative B	There would be long-term minor adverse impacts to wildlife and wildlife habitat, including state-listed species, from visitor presence and minor habitat fragmentation. Implementation of alternative B would have <i>no effect</i> on the Rio Grande silvery minnow; and is <i>not likely to adversely affect</i> the Big Bend mosquitofish, yellow-billed cuckoo, or Texas hornshell mussel.

CHAPTER 3: AFFECTED ENVIRONMENT

This chapter of the EA describes the existing environmental and human conditions in the areas potentially affected the alternatives evaluated. This section describes the following resources areas: visitor use and experience, socioeconomics and transboundary conditions, public health and safety, park operations and management, floodplains, wild and scenic rivers, water resources, soils and vegetation, and wildlife including federally and state-listed species. Potential impacts are discussed in “Chapter 4: Environmental Consequences” following the same order.

VISITOR USE AND EXPERIENCE

VISITATION

Visitation rates within the park vary from year to year and are dependent on a number of factors, some of which are not attributable to the park, its resources, and permitted activities. Such factors may include high gas prices, extreme weather events, and economic conditions. The park is considered one of the most remote of the national parks in the continental United States. The park was established during World War II, when automobile travel was restricted by gas rationing, and visitor facilities and services within the park were limited. The isolated location, far from urban centers and interstate highways, continues to play an important role in annual visitation (NPS 2010b).

Annual visitation to the area has steadily increased since the park was established in 1944, with some slight fluctuation (positive or negative) between and among years. In 1944, approximately 1,400 people visited the park. Twenty years later, in 1964, slightly less than 120,000 people came to enjoy the natural beauty, cultural resources, and recreation and leisure opportunities available in the park. Visitation in the 1970s ranged from 158,700 in 1974 to 378,600 just two years later. Table 5 demonstrates that since 2000 annual visitation to the park has ranged from a low of 262,320 in 2000 to a high of 398,583 in 2005 (NPS 2010c).

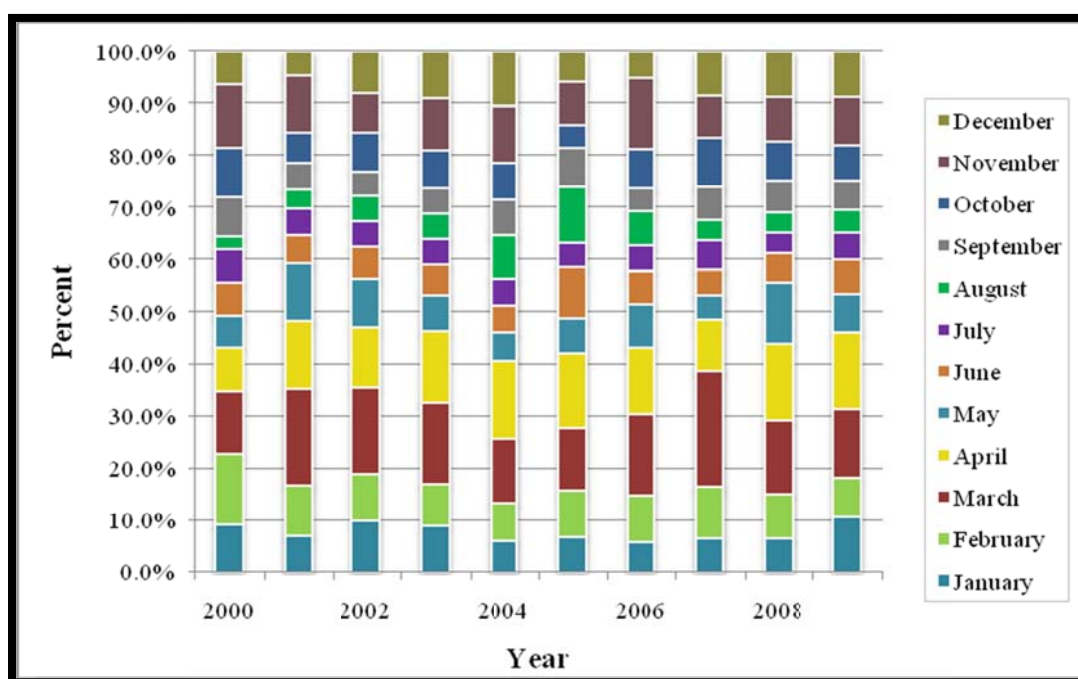
TABLE 5. ANNUAL BIG BEND NATIONAL PARK VISITATION (2000 TO 2009)

Year	Total Visitation	Percent Change
2000	262,320	—
2001	328,927	25.4
2002	327,747	-0.4
2003	312,384	-4.7
2004	357,723	14.5
2005	398,583	11.4
2006	298,717	-25.1
2007	364,856	22.1
2008	362,512	-0.6
2009	363,905	0.4

Source: NPS 2010c.

Weather patterns can help people identify times throughout the year when they would most like to visit the park. The large size and varied topography of the park supports a variety of temperatures, including

seasonal extremes. Visitation is generally highest in March and April, when the average high temperatures range from the upper 70s to low 80s (°F) and the wildflowers are in bloom (figure 12). Over the past decade, visitation during these months represented between 20.5 percent and 32.1 percent of total annual visitation. During the same period, for the three months when the average high temperature exceeds 90°F (June, July, and August) visitation ranged from between 13.4 percent to 25.3 percent of total annual patronage (NPS 2010c). Overall, visitation to the park is relatively low in October, ranging from between 4.4 percent to 9.6 percent of total annual visitation. This may be attributable, in part, to the amount of rainfall during the month, which has the highest average of all months (NPS 2010d).



Source: NPS 2010c.

FIGURE 12. PARK VISITATION BY MONTH AND YEAR (2000 TO 2009)

Park staff estimate approximately 18,000 people visited the Boquillas area before the border closure in 2002. The vast majority of visitors crossed to Boquillas for the purpose of making a day trip to the village. Occasionally, visitors used the crossing to access nearby points of interest, such as the Puerto Rico Mine of the Sierra Madera highlands, on self-guided trips. There were few accommodations or facilities for overnight staying or camping, and overnight visits were rare.

VISITOR ACTIVITIES

The proposed project area is not currently considered a high visitor use area and a gate along the existing dirt road restricts vehicular access to the site. Vehicular access to the proposed project area has not been permitted since the border closed in May 2002. This in combination with the remote location of the proposed project area in the park has not drawn many visitors since the border was closed.

Before the closure, visitor activities in the area were primarily related to traveling to the Boquillas crossing and wading or boating across the Rio Grande. Some visitors would frequent the park concessionaire in Rio Grande Village. Boaters traveling down the Rio Grande would stop on either side of the river to rest and to enjoy the local culture. Visitors who crossed the Rio Grande at the Boquillas

crossing would often enjoy an afternoon in the Mexican Boquillas with some tacos and beverage, and possibly the purchase of handicrafts made by area residents.

The following provides an overview of visitor activities available across the park. The vast size and varied topography in the park provide a range of recreation and leisure activities for visitors to enjoy. At many locations throughout the park, NPS staff is available to inform visitors of activities available to them. Staff also educates visitors about the cultural significance of the area and sites within the park to further expose them to the rich, diverse history of the area. In 2008, 635 interpretative programs were presented to 10,570 visitors, while 12 educational programs were given to 250 students. The Junior Ranger Program had 1,095 participants (NPS 2010e).

The geologic diversity across the park is a highlight of scenic drives and provides many viewing opportunities at various vistas and overlooks. The Basin and Ross Maxwell Scenic Drive, the Chisos Mountains, the Chihuahuan Desert, Sotol Vista, Mule Ears Overlook, South Rim, and Boquillas and Tuff Canyons, among many others, expose visitors to the rich geologic history of the area and protected areas just outside the park in Mexico. The Sierra del Carmen Mountains, located in Mexico, provide a scenic backdrop when looking across the Rio Grande at the village of Boquillas.

Rafting, canoeing, and kayaking trips down the Rio Grande are also popular activities enjoyed by park visitors. Such excursions are available from a half day to seven days. There were 751 river use permits issued in 2008 (NPS 2010e). Visiting the hot springs near the Deep Fault Well has become a popular visitor activity.

Wildlife viewing is another popular park activity. The diverse habitats within the park are suitable for many different animal and plant species. The park is home to 1,295 species of flora, 75 mammal species, more than 450 bird species, 56 reptile species, 11 amphibian species, and 38 fish species. Visitors can experience this diversity by simply visiting the park or exploring various areas with different elevation and topography. There are excellent birding sites near the project area; however, visitation to some of those sites is low because vehicular access to the proposed project area is not permitted. Common nesters near the Rio Grande Village include white-winged dove, black-chinned hummingbird, ladder-backed woodpecker, yellow-breasted chat, and orchard oriole, among many others (NPS 2010f).

SOCIOECONOMICS

As described in “Chapter 1: Purpose of and Need for Action,” communities on either side of the Rio Grande at Boquillas were established in the late 19th century to support mining activities just across the border in Mexico. These communities grew together, often experiencing many of the same trials, tribulations, and benefits of their remote location. They experienced success when the mines produced plentiful amounts of ore and endured hardship as resources were depleted. As resources were exhausted and the mines closed, the social and economic environment in these communities changed. People who remained continued to have a shared experience with those on the other side of the international boundary, much of which can be attributable to the continued ability to legally cross the Rio Grande. However, since the United States border closed in 2002, the ease at which such relations have been able to continue has been challenging. Because these communities grew together, both have been affected, socially and economically, from the closure.

Therefore, while the proposed project would be located just north of the Rio Grande in Texas, socioeconomic effects would be experienced by residents and businesses on either side of the river. As a result, the study area for this portion of the EA includes Brewster County, Texas (the county in which the park is located in its entirety). It also includes Boquillas, Mexico (the town just south on the Mexican side

of the river), in which residents have long used the crossing to buy and sell goods and to maintain relationships with friends and family north of the Rio Grande.

In the United States, current social and economic statistical data (2008 or 2009) are available for counties, but not all municipalities. Municipalities located in the park do not have populations large enough for current statistics to be available from the American Community Survey, a division of the U.S. Census Bureau. Additionally, only a small percentage of Brewster County residents live within the confines of the park. This in combination with the fact that effects of the proposed project would be experienced across the larger region, Brewster County in its entirety was established as the study area on the United States side of the international boundary.

While located in Mexico, the close proximity of Boquillas to the park makes it a contributor and benefactor of economic activity facilitated by legal passage across the international boundary. The historical interrelated nature of communities on either side of the river indicates the two cannot be considered mutually exclusive. As a result, social and economic conditions in Boquillas will also be examined in this section.

BREWSTER COUNTY, TEXAS

The park is located entirely in Brewster County and represents slightly more than 20 percent of all land area in the county. The county is the largest in terms of land area in Texas (Environmental Systems Research Institute [ESRI] 2009). It is located in one of the more remote parts of the state and is therefore not part of one of the many Metropolitan Statistical Areas located in Texas. As a result, the information presented below compares Brewster County to the state of Texas and the United States as a whole. This information was retrieved from the U.S. Department of Commerce's Bureau of Economic Analysis, U.S. Bureau of Labor Statistics, and the U.S. Census Bureau.

The population of Brewster County has increased at a significantly slower pace than either Texas or the United States overall. Since 1970, the county population has increased by approximately 1,500 people and represents less than 1 percent of the total Texas population. Alpine, which is located north of the park but also in Brewster County, is the most populated municipality in the county. In 2008, Alpine represented slightly less than 70 percent of the Brewster County population (U.S. Census Bureau 2010).

Per capita income in Brewster County in 2008 and 2009 was lower than either Texas or the United States. In 2008, the per capita income in Brewster County was \$30,922 as compared to \$37,809 for the state of Texas overall (BEA 2010b). Between 2000 and 2008, real per capita in Brewster County decreased by approximately 8.8 percent while the state of Texas and the United States overall experienced a decrease of approximately 10 percent.

Between 2001 and 2008, employment in Brewster County increased by 942 jobs or approximately 16.5 percent. In 2008, the three sectors representing the greatest share of total county employment included retail trade (16.4 percent), accommodation and food services (11.7 percent), and government and government enterprises (23.4 percent). These sectors also represented the greatest share of total county employment in 2001. Between 2001 and 2008, employment in retail trade increased by almost 50 percent while employment in government and government enterprises increased by approximately 12.6 percent. Employment in accommodation and food services experienced a decrease of approximately 3.7 percent. Since 2008, national and regional economies have experienced a recession and unemployment rates have gone up in many parts of the country. Therefore, it is likely employment in these industries has decreased since 2008; however, more current employment information is not yet available (BEA, 2010c).

Unemployment in Brewster County has consistently been lower than either the state of Texas or the United States overall. In 2009, the unemployment rate in Brewster County (4.9 percent) was 2.7 percent and 4.4 percent lower than in Texas and the United States, respectively (BLS 2010).

Visitor Spending

Visitation to the park and associated spending contribute to the local and regional economies. A change in visitation to the park or permitted activities (such as passage across the Boquillas crossing) has an effect on local economies in both the United States and Mexico. The following section presents information specific to the Boquillas area before the border closure as well as statistics for the park in 2009.

BOQUILLAS AREA

The Money Generation Model from the Department of Parks, Recreation, and Tourism Resources at Michigan State University estimates visitor spending by visitor type (i.e., local day trips, non-local trips, overnight stays, and camping). Park staff estimate 18,000 people visited the Boquillas area before the border closure. The model estimates that park visitors to the Boquillas area spent approximately \$1.46 million annually in the local and regional economies. It is anticipated that the majority of such spending can be associated with accommodations, retail trade, and services sectors. While some visitors may have elected to spend a night in Mexico, the majority of overnight stays are thought to be in park lodging, camping facilities, and in nearby communities.

The park concessionaire, whose operation includes a store at Rio Grande Village, estimates a \$270,000 (in 2009 dollars) decrease in annual revenue from the loss of visitor spending and purchases made by Boquillas residents. The concessionaire also estimates approximately 40 percent or \$71,300 of the stores annual revenue is generated by purchases made by Boquillas residents. Park visitors to the area purchased approximately \$162,000 in goods and services from the park concessionaire, or \$9 in spending per visitor.

Stynes Report

The *2009 Economic Benefits to Local Communities from National Park Visitation and Payroll* prepared by Daniel Stynes from Michigan State University provides estimates of NPS visitor spending for 2009 to estimate economic impacts associated with visitor and NPS employee spending on local economies. As passage across the international border is not currently permitted and Boquillas is located outside of the park, total visitor and NPS employee spending is only identified for those areas located within the park.

Visitor spending is presented for local and non-local visitors. Non-local visitors are those travelling 60 miles or more to enjoy the resource². Economic impacts are only estimated for non-local visitor spending. The report estimates 363,905 visitors to the park in 2009 and total visitor spending at approximately \$15,391,000. The report attributes 95.7 percent of visitor spending (\$14,736,000) as generated by non-local visitors. Many visitors spend an overnight in the local area because of the size and remote location of the park. In 2009, approximately 46.9 percent or 170,616 visitors had an overnight stay in the area.

Stynes estimates 219 jobs in the areas surrounding the park area are directly attributable to non-local visitor spending and an additional 148 jobs are sustained by spending from the 131 NPS employees at the park. One job is supported for every \$67,288 in non-local visitor spending.

² The 60-mile radius is a general average representing the primary impact region around most parks. The radius is closer to 30 miles in urban environments and as large as 100 miles for some western parks.

Transboundary Economic Conditions

The *Instituto Nacional de Estadística y Geografía* maintains demographic information for the people of Mexico. Information is maintained for individual states and certain municipalities. However, demographic information from this source is not available for the village of Boquillas. The following provides an overview of social and economic conditions in Boquillas based on conversations with park staff and other sources.

Limited economic opportunities resulting from the inability to move freely across the border has caused many people to move from Boquillas. NPS staff estimates the population is one-third the size it was before the border closure with approximately 30 families remaining (Elkowitz, personal communication, 2011).

Before the border crossing closure, Boquillas residents would travel across the Rio Grande to purchase goods and services from the park concessionaire, to pick up mail, and to visit friends and family. They would also sell local handicrafts and other goods and services to park visitors who entered Mexico via the Boquillas crossing. Occasionally during special events and fiestas, Boquillas residents would sell their goods on the United States side of the crossing. Because of the border closure, Boquillas residents have not been able to partake in any of these activities, and the park concessionaire at Rio Grande Village has lost a portion of its income from their lack of patronage. Boquillas residents who were previously selling local handicrafts to park visitors who entered Mexico, no longer have access to this source of income, which has affected their economic livelihood.

When passage across the Rio Grande was legal, park visitors would often spend an afternoon and sometimes enjoy an overnight in Boquillas enjoying the sites and culture. They would purchase goods and services from local establishments as well as handicrafts made and sold by merchants. Local establishments and merchants have been affected by the inability of visitors to legally cross the river. Restaurants and a newly opened bed and breakfast business are no longer open because there is not enough economic activity to support them.

A small group called Fronteras Unlimited assisted Boquillas women in developing a quilting industry. The group, which was run by volunteers, operated from 2003 to 2008. When the group was first formed, volunteers collected and transported goods to the people of Boquillas because they had few options to purchase or to sell goods and services. By 2005, the group of volunteers had helped the women of Boquillas develop a quilting industry. American volunteers would transport the quilts and other crafts across the POE in Del Rio, Texas, sell the goods in municipalities within close proximity to the park such as Alpine and Marfa, and return the money generated by sales to the women who made the quilts. The efforts of this group provided much needed income to the people of Boquillas (de Narvaez, personal communication, 2011). There are others who also make the trip from Boquillas to the United States via the POEs in Presidio or Del Rio, Texas, to sell handicrafts made by Boquillas residents. It is anticipated that efforts would be made to allow such activities across the Rio Grande at Boquillas.

PUBLIC HEALTH AND SAFETY

The NPS is committed to providing high quality opportunities for visitors and employees to enjoy parks in a safe and healthy environment. Furthermore, the NPS strives to protect human life and provide for injury-free visits. Safety applies to park visitors as well as park employees.

A visitor incident is defined as an unintentional event or mishap affecting any person, other than an NPS employee, resulting in serious injury or illness requiring medical treatment. The following information, from the 2008 calendar year, is inclusive of all areas within the park open to the public. In 2008, there

were 24 search and rescue missions, 26 motor vehicle accidents, 114 emergency medical incidents, and three fatalities in the park (NPS 2010e). None of these incidents were associated with the Boquillas crossing area. The proposed project area is not currently considered a high visitor use area and a gate along the existing dirt road restricts vehicular access to the site.

Currently, there are no cameras or other security measures in place at or near the project site. Because the Boquillas crossing and roadway access to the project site are closed to visitors on either side of the border, the area is not generally considered a risk to public health and safety. However, the closure of the border has restricted the free flow of information between the two countries regarding public health and safety, including drug trafficking and smuggling (Etheridge, personal communication, 2011).

PARK OPERATIONS AND MANAGEMENT

The superintendent of Big Bend National Park is responsible for managing the park, its staff and residents, all of its programs, and interactions with visitors, agencies, and organizations interested in the park. Park staff provides the full scope of functions and activities to accomplish management objectives and meet the requirements of park protection, emergency services, park health and safety, science, resource protection and management, interpretation and education, utilities, and management support. Currently, there are 103 full-time employees supplemented by 58 temporary and seasonal staff. There are an additional 32 permanent and 39 seasonal employees associated with Forever Resorts, which provides concessionaire services within the park. The Big Bend Natural History Association employs a staff of three people. In 2008, there were 241 volunteers and 7 Student Conservation Association volunteers who contributed a combined 38,382 hours of service (NPS 2010e).

Park law enforcement resides in the nearby Barker House. Additionally, two CBP officials reside in Rio Grande Village. Rio Grande Village is home to camping options and the park concessionaire. Because the area attracts some visitors, although fewer than when the Boquillas crossing was open, local law enforcement patrols the general vicinity of the proposed project.

Mexican nationals who live in the small villages near the border have assisted in the park fire management program for the past two decades. Known as “Los Diablos” to park staff, they provide crucial services in fighting wildfires and in implementing and managing prescribed fire as part of the ongoing commitment of the park to sustainable resource management.

WILD AND SCENIC RIVERS

In 1978, Congress designated a segment of the Rio Grande a national wild and scenic river under the *Wild and Scenic Rivers Act* (WSRA). The designated section of the Rio Grande begins in the park, opposite the boundary between the Mexican states of Chihuahua and Coahuila. It then continues through Mariscal and Boquillas canyons and ends at the county line between Terrell and Val Verde counties, Texas (NPS 2004d). The designated portion of the river within the park is 69 miles. Figure 13 illustrates a portion of the Rio Grande near the project area.



Source: NPS 2011a.

FIGURE 13. RIO GRANDE NEAR BOQUILLAS

Under the WSRA, the selected river must possess outstandingly remarkable scenic, geologic, fish and wildlife, recreational, or other values. If a river possesses any or a combination of these values, it is eligible for WSRA classification, which are defined by the following three river classes (16 USC 1271-1287):

- **Wild River Areas** – Rivers or section of rivers free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and with unpolluted water. These represent vestiges of primitive America.
- **Scenic River Areas** – Rivers or sections of rivers free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.
- **Recreational River Areas** – Rivers or sections of rivers readily accessible by road or railroad that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

The Rio Grande has sections that are designated under all three classes. The section from Solis to the entrance of Boquillas Canyon, which includes the proposed project area, is classified as scenic. Under the scenic classification, desired conditions and processes are mostly natural. Natural and historic landscapes are maintained as much as possible, and all values considered outstandingly remarkable are protected. This type of classification allows for moderate carrying capacity of visitors for locations accessible in some places by roads and in other places by trails (NPS 2004d, 2004e). While there are visitor use restrictions and restrictions on development, certain land use development is acceptable.

The river segment adjacent to the proposed project area exhibits a number of outstandingly remarkable scenic values, including scenic views of the river and surrounding canyons as well as other sites. Rugged steep walled canyons and river rapids contribute to the scenic quality. The river has a number of geologic values including the exposure and view of rock layers placed about 100 million years ago. At the location of the historic Boquillas crossing, scenic sites are visible from the river adding to the cultural appeal;

specifically, the village of Boquillas in Mexico and the historic Barker House to the northeast. Many geologic features are visible from the project location. On the Texas side of the Rio Grande, the mouth of Boquillas Canyon is visible downstream, and the Chisos Mountains can be seen to the west. On the Mexican side of the river, the Sierra del Carmen Mountains loom large over the village of Boquillas; this is “one of the most beautiful sights in the park” (MacLeod 2008) (figure 14). In addition, this reach of the river becomes slightly more volatile, with a faster current and river rapids.



Source: NPS 2011a.

FIGURE 14. BOQUILLAS AND THE SIERRA DEL CARMEN MOUNTAINS

In addition to the geologic and cultural scenic qualities, this section of the Rio Grande has a number of wildlife species that provide an exceptional example of the Chihuahuan Desert fauna depend on the rare aquatic and riparian habitats created by the river. Peregrine falcons, delisted but under post-delisting monitoring criteria, and yellow-billed cuckoo, a candidate species, use the river as a travel corridor (see Wildlife in “Chapter 3: Affected Environment”). Impacts from human uses in the area are few and unobtrusive, allowing visitors to experience the grandeur of the wilderness. Although subjective, the quality of the scenery and natural landscape qualify scenic resources as an outstandingly remarkable value under the WSRA.

Recreational opportunities along this stretch are somewhat limited by the need to protect river scenic values, and because the former crossing site has been closed to vehicular access since 2002. Traditional visitor uses included ferry crossings provided by local vendors and crossings by wading and horseback (NPS 2004d).

The WSRA also emphasizes the water quality of the river. The quality of water in the Rio Grande through the Big Bend region and through the proposed border crossing area is highly variable. Seasonal high flows and storm events can increase the sediment load of the river, a natural occurrence in areas with low vegetation cover. Park staff samples the water for bacterial levels on a monthly basis at several locations within the park. The samples require 24 hours for incubation, delaying results and preventing timely notification of poor water quality conditions. However, the sample results have shown some trends between river-flow levels and high bacteria counts.

The data shows bacterial counts rise just after rainstorms. When flow levels are rising, bacterial counts may exceed the recommended levels for contact recreation such as swimming. This is likely caused by

runoff from creeks and other tributaries carrying animal waste and other pollutants into the Rio Grande. This occurs primarily during the summer monsoon season, between June and October, but can happen any time throughout the year.

Conversely, during periods of prolonged low flows, bacterial levels tend to be low and well within safe limits of state standards for recreation. During low flows, the river tends to be high in salts as is common in desert rivers. The high salinity may reduce the amount of bacteria in the water during low flows. Because many of the small communities along the river do not have adequate sewage treatment facilities, there may be bacteria in the water immediately downstream of these towns even during periods of low flow. Although the proposed project may result in localized sediment release into the river, bacterial and other biological components of the river would not change, therefore these are not addressed further.

WATER RESOURCES

Although the park landscape is arid and generally sparsely vegetated, its intricate geological, natural, and cultural histories are water driven. The project area is located in the southern part of the park, on the north side of the Rio Grande meander. The Rio Grande is the only perennial stream in the area. The Deep Fault Well, located approximately ½ mile northwest of the proposed project area, currently represents the only existing source of potable drinking water. The well produces water from a local Cretaceous aged aquifer. The amount of water available to the water supply and associated springs is highly dependent on rainfall.

The project area is underlain by Quaternary or Tertiary deposits of the Rio Grande and tributary drainages. These alluvial sediments consist of sand, gravel, and clay and may be as much as 300 feet thick in the area. Although sediments found in these areas are conducive for water use, the depth can pose significant problems and cause difficulty in water usage (NPS 2006b).

The Santa Elena Formation is the primary source of water in the Deep Fault Well. This limestone formation is approximately 550 feet thick and underlies much of the area from Boquillas to Rio Grande Village. Water from the local limestone aquifer supports the occurrence of hot springs in the area (NPS 2006). Similar to general water availability, these hot springs have seen a decline in water supply, having possible effects on the visitor use and experience in the park because these springs have become tourist destinations (NPS n.d.).

The thermal nature of spring water within the park has numerous effects on wildlife habitat and water supply. Increased thermal temperatures can force changes in species habitat. This is particularly true for the Big Bend mosquitofish, which has habitat located near the proposed project and has adapted to the thermal qualities of the springs (see Wildlife, State-listed Species in “Chapter 3: Affected Environment”). While this species was able to adapt, a further reduction of water resources and changes to water habitats could be detrimental to certain species.

While water has worked over millions of years to create the features present in the park today, it has historically been in short supply (NPS 2004f). Today, the Rio Grande flows with less water than 20 years ago. Many reliable springs no longer flow or flow only intermittently. Invasive exotic species such as saltcedar monopolize springs, soak up water, and transform soils to salt beds. Additionally, feral hogs and trespassing livestock dig up or trample springs, disrupting their flow. As soil-holding grasses have disappeared in some instances, sheet flooding after a downpour rearranges and erodes the exposed desert soils (NPS 2004f).

Overall, the general absence of water in the area and rock qualities, including the depth and type of material present within the park, are all contributors to the potential for water shortages. In Rio Grande Village, located approximately 2 miles west of the proposed project area, the peak monthly water use

demand put on the system from nearby areas is 5.9 gallons per minute (gpm) and the peak two-week flow rate is 8.5 gpm, with water use and flow being lower most of the year (NPS 2006). Although the water system is currently meeting demand, the park is undertaking conservation measures to ensure that established use rates do not increase in the future.

FLOODPLAINS

Flooding is a natural process that forms and maintains river corridors. Periodic flows of water that overtop riverbanks are the lifeblood of the riparian corridors and marshes. Combined, the seasonal variability of flow and intermittent extreme events determine the physical structure and biological diversity of floodplains. Seasonal and storm-generated variations in water flow, including periodic flooding, are part of the normal function of the floodplain. Inundation of these areas outside the riverbank keeps erosion and accretion in equilibrium, replenishes soils, and recharges groundwater. High flows are critical to maintaining vegetation because they transport sediment and nutrients from the river to the connecting floodplain. The ecological integrity of a floodplain depends on the supply of water, sediment, nutrients and the stability of vegetation in the flood zone (AFSPM 2008).

The Federal Emergency Management Agency (FEMA) produces a Flood Insurance Rate Map (FIRM) identifying special hazard areas and risk premium zones applicable to the community. The proposed project area is located on community-panel number 480084 1500 B, revised on October 15, 1985. Newer FEMA maps are not available for the area and the site flood hazard remains undetermined. A review of the FIRM and conversations with park staff indicates the existing trail, which would be rehabilitated as part of the proposed project, is located inside the 100-year floodplain while part or all of the proposed visitor contact station likely falls outside the 100-year floodplain (figure 15). Areas within the 100-year floodplain refer to the 1 percent annual chance of a flood event occurring in the floodplain (FEMA 2011).

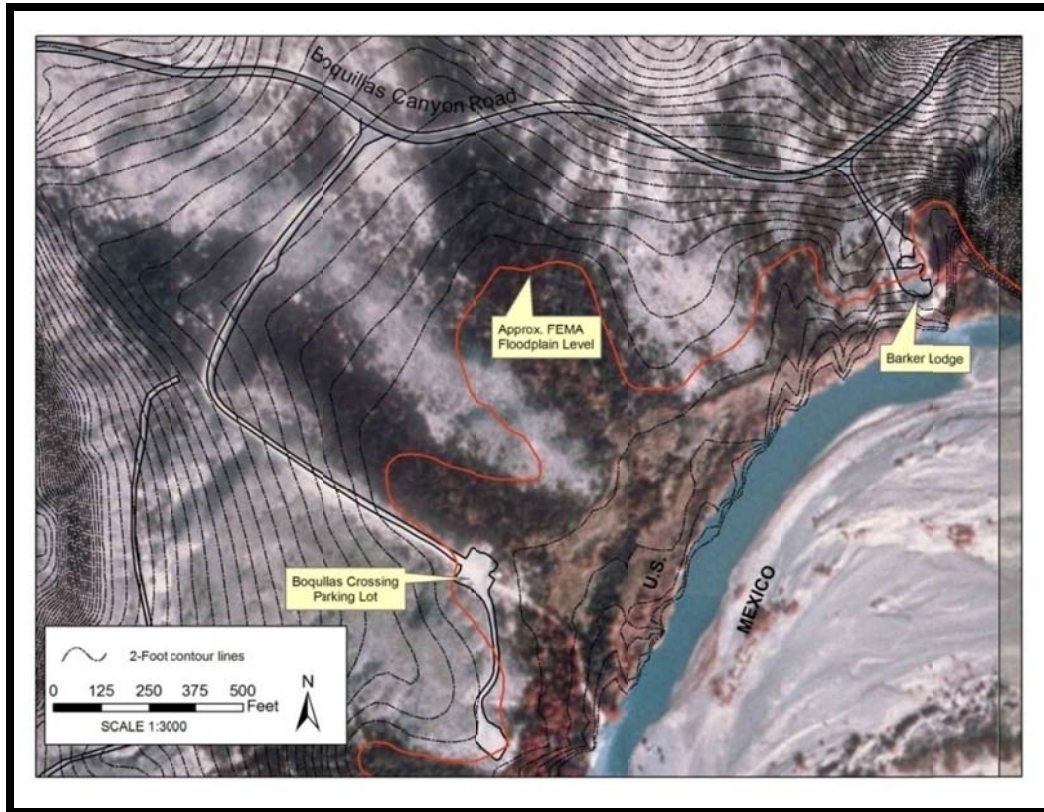
This determination is based upon the prevalence of desert vegetation, the absence of riparian or mesic vegetation, and the observation that the flood of 2008, which reached record stage elevations, did not inundate the proposed visitor contact station site. Additionally, the asymmetric shape of the channel in this area places most of the channel capacity on the Mexican side of the thalweg; a position on the Mexican side of the equivalent elevation to the proposed visitor contact station site, which is approximately 1,000 feet from the thalweg. Under EO 11988, federal agencies are instructed to reduce or eliminate development in floodplains when other viable alternatives are present. This is reiterated in *Director's Order 77-2: Floodplain Management* (NPS 2003) for projects falling under the auspices of the NPS. This section will describe floodplain features within the park and those areas with immediate proximity to the proposed project area.

Area topography, soils, and climate contribute to the unique flood regime within the park. One of the most notable of these factors is the water flow dependence of the Rio Grande on the Rio Conchos in Mexico and other watersheds upstream of the project area. Water flow in the river also depends on heavy rains and extreme weather events. Intense storms can result in large runoff events; however, flood peaks are attenuated by broad, flat valleys that produce slow-moving, long-duration floods.

Near the proposed project area, the land surface is somewhat level with gradual slopes ranging from 0 to 3 percent. The proposed visitor contact station would be sited on northern edge of the floodplain at the upper part of the hill. Soils in the area contain high clay, gravel, sand, and silt content and are moderately to well-drained.

Typically, floods of the Rio Grande, particularly those close to the proposed project site, occur from heavy rains on the Rio Conchos and other watersheds, which cause the Rio Grande to overflow its banks, flooding areas with 1 to 10 feet of water. Flooding occurs about once every three to five years. Inundation

usually lasts from two to 20 days. Thin layers of fresh alluvium are deposited during each flood (NPS 2004f). Flows in the Rio Grande exceeding the capacity of the established channel occur somewhat frequently (about once every three to five years). However, floods reaching elevations greater than 10 feet above the average river surface height occur only in extremely large and rare events.



Source: NPS no date.

FIGURE 15. 100-YEAR FLOODPLAIN OF THE PROJECT AREA

Along the river, everyday flow velocities can be expected to be very low because the gradient of the Rio Grande is low (about 5 feet per mile) and the floodplain is relatively wide. The combination of these factors makes rapid and dangerous flooding near the proposed project area highly unlikely. The largest floods occurring in the Rio Grande originate from precipitation over a large area and can usually be observed upstream, well in advance of arrival in the park, particularly those areas near the proposed project area. Even a very large tributary flood would result in an attenuated and much smaller relative event in the main river. For these reasons, flash flooding of resources at the extreme edge of the 100-year floodplain is not a great concern (NPS 2004f). However, any development occurring within the 100-year floodplain is at risk.

In the past, portions of the park as well as areas outside the park adjacent to the Rio Grande have been damaged by flood events. The most significant flood in recent years occurred in 2008 as a result of tropical depression Lowell, which dropped extreme amounts of precipitation in the Mexican state of Chihuahua, southwest of the park. During this period, a large amount of rainwater flowed into the Rio Conchos watershed (the primary source of water in the Rio Grande as it flows through the park), resulting in the deepest flood in the recorded park history. Flows on the river normally 2 to 3 feet deep grew to over 30 feet deep in places. Although damage within the park and nearby areas outside the park was extensive, areas within the immediate vicinity of the proposed project experienced only a slight increase in water

levels and negligible to no damage. The site of the proposed visitor contact station was not inundated during this event. The previous flood of significant size occurred in 1991.

SOILS AND VEGETATION

SOILS

The geologically diverse landscape is mostly characterized by sedimentary rocks deposited between 65 and 140 million years ago that were pierced, intruded, and partially overlain by volcanic/igneous rocks between 17 and 42 million years ago. Subsequent erosion and resistance of the rocks to erosion created the combined mountainous and lowland terrain seen in the park today (USDA 1985).

Soil types in the park vary by elevation. At higher elevations, soils tend to be rocky and are resistant to erosion. These soils are generally suitable for construction activity. Soils at lower elevations contain softer rocks and are less resistant to erosion making them less suitable for construction activities. Within the proposed project area, there are three types of soil substrates (floodplain soils, gravelly upland soils, and fill material) (USDA 1985).

Floodplain soils along the bank of the Rio Grande are loamy, which indicates they consist of finer grains of silt, clay, and sand, as well as coarser elements such as gravel reminiscent of soils typically found on a floodplain (figure 16). These soils have a gradual slope of 0 percent to 3 percent, are very deep, and are moderately to well-drained. However, they are not highly suitable for construction activity and have a high potential for erosion. West of the Rio Grande, soils maintain their loamy structure. Moving west and to higher elevations, where the visitor contact station is proposed, the soils are shallower and composed of coarser materials, such as gravel. Such soils are not highly suitable for construction activities; however, the proposed project site is more appropriate than other areas closer to the riverbanks of the Rio Grande. Additionally, much of the area proposed for construction located at and adjacent to the existing parking area was filled to support prior uses (USDA 1985). The fill material generally contains a variety of grain sizes, from clay to small gravel, and was used to stabilize the existing access road and parking areas.



Source: NPS 2011a.

FIGURE 16. GRAVELLY UPLAND SOILS IN THE PROJECT AREA

VEGETATION

The six primary vegetation types present in the park include forest, grassy woodland, shrub woodland, high desert grassland, floodplain/upland riparian, and desert shrub (NPS 2005). Two of these vegetation types (floodplain/upland riparian and desert shrub) are present within the proposed project area. However, because much of the proposed project area has previously been disturbed or filled, vegetation is sparse and, in certain locations, has been absent for decades.

Abundant vegetation along the riverbank is classified as floodplain/upland riparian. The Rio Grande, with a high water table and dependable water year round, supports considerable stands of vegetation and vital habitat for wildlife. The predominant riparian vegetation consists of a mosaic of mesquite (*Prosopis glandulosa*) and huisache (sweet acacia, *Acacia farnesiana*) thickets or bosques, and dense stands of invasive exotic saltcedar (*Tamarix* spp.) or giant cane (*Arundo donax*) (NPS 2005; Wauer and Fleming 2002). The river and associated springs also support widely scattered small gallery forests of cottonwood (primarily *Populus fremontii*) and willow (*Salix* spp.) (NPS 2005). The proposed project site is adjacent to such patch of forest, which is not a typical riparian plant community in the Big Bend reach of the Rio Grande. Exotic bermudagrass (*Cynodon dactylon*) is abundant and is commonly the dominant understory grass species. The park, in cooperation with protected area staff in Mexico, is currently pursuing active management of invasive exotic plant species.

The upland desert habitat in the proposed project area consists of desert shrubs and succulents, with little grass or forb cover. Typical dominant species include creosotebush (*Larrea tridentata*), prickly pear (*Opuntia* spp.) and other cacti, and the succulent lechuguilla (*Agave lechuguilla*) (NPS 2005; Wauer and Fleming 2002).

In upland sites of the proposed project area, desert shrub is the principal vegetative type. In these areas, vegetation is sparse and shrubs and succulents dominate the landscape with grass patches. The most abundant type of vegetation in the project area is Creosote bush (*Larria tridentata*) with the potential for other shrubs including Mariola (*Parthenium incanum*) and the Ocotillo (*Fouquieria splendens*) (Wauer and Fleming 2002). Types of succulents found in the area include Lechuguilla (*Agave lechuguilla*), False agave (*Hechtia texensis*), and Prickly Pear (*Opuntia*). Additionally, a number of wildflowers exist in the area (NPS 2005).

WILDLIFE AND WILDLIFE HABITAT, INCLUDING SPECIAL-STATUS SPECIES

The park provides desert, riparian, and mountain habitats for a variety of species, including mammals, reptiles, amphibians, birds, and fish (NPS 2008a). The park boasts more types of birds, bats, and cacti than any other national park in the United States. Contrasting elevations in the park create varied microclimates, further enhancing plant and animal life diversity (NPS 2010f). This section focuses on native terrestrial and aquatic wildlife species in the park possibly affected by the proposed construction and operation of the proposed project.

MAMMALS

The proposed project area and Boquillas crossing support several mammal species dependent on the diverse habitats existing along the Rio Grande floodplain. Common carnivorous mammals include coyote (*Canis latrans*) and gray fox (*Urocyon cinereoargenteus*) (U.S. Geological Survey [USGS] 2006a), which live throughout the park in a variety of habitats including open plains, brushy woodlands, and shrublands (Sullivan 1996; TPWD 2009). Black bears (*Ursus americanus*) were extirpated from the area before

establishment of the park, and began to reestablish a resident population in the Chisos Mountains in the mid-1980s (USGS 2006a). Currently, they are sighted in many areas of the park but primarily live and breed in the Chisos Mountains. Most bears moving through the river and desert zone are males or females without cubs (NPS 2010h).

Mountain lions (*Felis concolor*) are known to live throughout the park and help balance herbivores and vegetation in the delicate habitats of the Chihuahuan Desert. Each year, over 150 lion sightings are reported by park visitors (NPS 2009a). The bobcat (*Lynx rufus*) is most common cat in the park, although most cat sightings are of the larger mountain lion. This species is known to live throughout the park, primarily in brushy areas near water (USGS 2006a).

Eight ungulate species are known to live within the park in varying abundance (USGS 2006a). The collared peccary (*Tayassu tajacu*), commonly known as the javelina, is considered common in the park and thrive in a variety of habitats (NPS 2010i; USGS 2006a). Mule deer (*Odocoileus hemionus*) are well adapted to the desert environment. This common species lives most frequently near springs surrounding the Chisos Mountains.

Common small mammals in lowland and riparian habitats include desert cottontail (*Sylvilagus audubonii*), porcupine (*Erethizon dorsatum*), long-tailed weasel (*Mustela frenata*), American badger (*Taxidea taxus*), striped skunk (*Mephitis mephitis*), and several varieties of rats and mice. Other small mammals in the park include yellow-faced gopher (*Cratogeomys castanops*), American beaver (*Castor canadensis*), nutria (*Myocastor coypus*), and common raccoon (*Procyon lotor*) (USGS 2006a).

Twenty species of bats have been recorded in the park with varying abundance. The warm climate, abundance of insects, and variety of habitat types make the park an ideal place for bats to live. There are not many caves in Big Bend National Park, so the majority of park bats use rock shelters, crevices, dead trees, and mine shafts (NPS 2010j). Among the species of bats recorded in the park are the California myotis (*Myotis californicus*), fringed myotis (*Myotis thysanodes*), hoary bat (*Lasiurus cinereus*), Townsend's big-eared bat (*Plecotus townsendii*), pocketed free-tailed bat (*Nyctinomops ferrosacca*), Yuma myotis (*Myotis yumanensis*), and big free-tailed bat (*Nyctinomops macrotis*). Many of these species occur most commonly at lower elevations in the park near the Rio Grande. The spotted bat (*Euderma maculatum*) is considered the most spectacular bat as more of them have been recorded in the park than anywhere else in Texas. They are found throughout the park, but more often in the lower elevations (USGS 2006a).

BIRDS

The wide diversity of habitat types in the park creates a variety of plant zones that support more than 450 bird species (NPS 2010k). According to the September 1999 USGS checklist (USGS 2006b), 56 species are year-round residents, 120 are neotropical migrants, 113 are known to nest, and 38 are summer-only residents. In addition, approximately 100 species over-winter in the park (Wauer and Fleming 2002).

Key bird habitats in the park include river floodplain, shrub desert, grasslands/foothills, piñon-oak-juniper woodlands, and moist woodland (USGS 2006b). Species described below include those occurring within the river floodplain and shrub desert habitats, as actions associated with this plan/EA would be limited to these areas.

The floodplain is adjacent to the Rio Grande and throughout its entire length, except where sheer walls or artificial structures restrict the river course. Groves of cottonwood, tamarisk, and willow are found at springs and where the river channel has deserted an old terrace. The areas of riparian growth, such as the flats below Castolon and at Rio Grande Village, are excellent birding sites. Common nesters in these

areas (or similar areas) include white-winged dove (*Zenaida asiatica*), elf owl (*Micrathene whitneyi*), black-chinned hummingbird (*Archilochus alexandri*), ladder-backed woodpecker (*Picoides scalaris*), vermilion flycatcher (*Pyrocephalus rubinus*), Bell's vireo (*Vireo bellii*), common yellowthroat (*Geothlypis trichas*), yellow-breasted chat (*Icteria virens*), brown-headed cowbird (*Molothrus ater*), orchard oriole (*Icterus spurius*), summer tanager (*Piranga rubra*), northern cardinal (*Cardinalis cardinalis*), blue grosbeak (*Passerina caerulea*), and painted bunting (*Passerina ciris*) (NPS 2010k).

Other nesting species known to live in the park river floodplain and/or shrub desert habitats include turkey vulture (*Cathartes aura*), Harris Hawk (*Parabuteo unicinctus*), American kestrel (*Falco sparverius*), scaled quail (*Callipepla squamata*), greater roadrunner (*Geococcyx californianus*), great horned owl (*Bubo virginianus*), Say's phoebe (*Sayornis saya*), northern rough-winged swallow (*Stelgidopteryx serripennis*), common raven (*Corvus corax*), verdin (*Auriparus flaviceps*), canyon wren (*Catherpes mexicanus*), blue-gray gnatcatcher (*Poliophtila caerulea*), gray catbird (*Dumetella carolinensis*), and Canyon towhee (*Melospiza fuscus*). Many of these species live in the park year-round, with a few exceptions (USGS 2006b).

Nonbreeding winter residents known to inhabit the park river floodplain include ruby-crowned kinglet (*Regulus calendula*), orange-crowned (*Vermivora celata*) and yellow-rumped warblers (*Dendroica coronata*), and a variety of sparrows. During warm years, one can often find dusky (*Empidonax oberholseri*) and gray flycatchers (*Empidonax wrightii*), as well as crissal (*Toxostoma crissale*) and sage thrashers (*Oreoscoptes montanus*) (USGS 2006b; Wauer and Fleming 2002).

REPTILES AND AMPHIBIANS

Approximately 56 species of reptiles and 12 species of amphibians are known to live in the park, including turtles, lizards, snakes, frogs, and toads (NPS 2010f). The herpetofauna (amphibians and reptiles) at Big Bend is surprisingly diverse due to the contrasting elevations and microclimates found among the Chisos Mountains, Chihuahuan Desert, and the banks of the Rio Grande (NPS 2010f; USGS 2006c).

Frogs and toads comprise the only group of amphibians found in the park. Common species known to live in the Rio Grande floodplain include red-spotted toad (*Bufo punctatus*), Texas toad (*Bufo speciosus*), Rio Grande leopard frog (*Rana berlandieri*), and couch's spadefoot toad (*Scaphiopus couchii*). Other less common species known along the Rio Grande include the Great Plain's narrow-mouthed toad (*Gastrophryne olivacea*). The bullfrog (*Rana catesbeiana*) was established in beaver pond at Rio Grande Village, and lives along the Rio Grande. The majority of these species are burrowing and nocturnal, some of which (i.e., Great Plains narrow-mouthed toad and couch's spadefoot) are most active after heavy rains (USGS 2006c).

Of the seven species of turtles known to live in the park, several could inhabit the project area along the river (NPS 2010l). The most common species in the Rio Grande is the Big Bend slider (*Trachemys gaigeae*), which only lives in the Rio Grande floodplain (NPS 2010f; USGS 2006c). Also found along the river is the spiny softshell turtle (*Trionyx spiniferus*), the yellow mud turtle (*Kinosternon flavescens*), and in very small numbers, the Rio Grande river cooter (*Pseudemys gorzugi*), which was found in the park in 2005 (NPS 2010m). Although the park checklist includes the Texas tortoise (*Gopherus berlandieri*), they are not found regularly enough and are not considered resident (NPS 2010m).

Lizards play an important role in the desert ecosystem at Big Bend, serving as main prey items for certain species, as well as regulating the populations of other animals by feeding upon them. Twenty-two lizard species are found in the park. During the heat of the summer, they are often hiding in burrows while in the cold of the winter they are often buried below the ground surface (NPS 2010n). Common species known

to live along the Rio Grande floodplain to the Chisos Mountains and foothills include southwestern earless lizard (*Cophosaurus texanus*), longnose leopard lizard (*Crotaphytus wislizeni*), round-tailed horned lizard (*Phrynosoma modestum*), checkered whiptail (*Cnemidophorus tesselatus*), desert spiny lizard (*Sceloporus magister*), canyon lizard (*Sceloporus merriami*), marbled whiptail (*Cnemidophorus marmoratus*), eastern fence lizard (*Sceloporus undulatus*), and side-blotched lizard (*Uta stansburiana*). The rare Mediterranean gecko (*Hemidactylus turcicus*) is known only from Rio Grande Village and across the river at Boquillas, Mexico, and is a nocturnal species commonly associated with human habitation, buildings, and lights. Another rare species, the longnose leopard lizard (*Crotaphytus wislizeni*), was recorded at Tornillo Flat (base of the Rosillos Mountains) between Panther Junction and Rio Grande Village, near Boquillas and San Vicente. The short-lined (*Eumeces tetragrammus*) and Great Plains skink (*Eumeces obsoletus*) are considered uncommon but are known to live parkwide (USGS 2006c).

There are 31 species of snakes known to live within the park (NPS 2010l), including five venomous species (USGS 2006c). The red racer or western coachwhip (*Masticophis flagellum*) is the most commonly seen snake in the park due to its distinct color and its habit of lying in the middle of the road (NPS 2010o). This species inhabits deserts, lowlands, and shrublands, and is known to live along the Rio Grande floodplain to the Chisos Mountains (USGS 2006c). Black-necked (*Thamnophis cyrtopsis*) and checkered (*Thamnophis marcianus*) garter snakes are found around water, where they most commonly hunt for frogs and toads (NPS 2010o). The park checkered garter snake population is restricted to the Rio Grande floodplain and its major tributaries. Other snake species known to inhabit the Rio Grande floodplain include Trans-Pecos blind snake (*Leptotyphlops humilis*), glossy snake (*Arizona elegans*), Great Plains rat snake (*Elaphe guttata*), desert kingsnake (*Lampropeltis getula*), striped whipsnake (*Masticophis taeniatus*), blotched water snake (*Nerodia erythrogaster*), long-nosed snake (*Rhinocheilus lecontei*), Big Bend patch-nosed snake (*Salvadora deserticola*), ground snake (*Sonora semiannulata*), western diamondback rattlesnake (*Crotalus atrox*), and Mojave rattlesnake (*Crotalus scutulatus*) (USGS 2006c).

FISH

As a desert park, only a few places in Big Bend support fish. The Rio Grande and its two tributaries – the Tornillo and Terlingua Creeks – are the only inhabited locations. There are 40 species of fish living in park aquatic habitats. Catfish are commonly caught in the Rio Grande, including blue (*Ictalurus furcatus*), channel (*Ictalurus punctatus*), and flathead (*Pylodictis olivaris*) (NPS 2010p). Gizzard shad (*Dorosoma cepedianum*) frequent quiet waters of the Rio Grande, and the blue sucker (*Cycleptus elongatus*) prefers swift currents. Other Rio Grande fish large enough to be caught include smallmouth buffalo (*Ictiobus bubalus*), river carpsucker (*Carpiodes carpio*), and freshwater drum (*Aplodinotus grunniens*) (Wauer and Fleming 2002). Most of the native fish in the park are minnow sized (NPS 2010p; Wauer and Fleming 2002). Mexican stoneroller (*Campostoma ornatum*) is known in the United States only from the park area and Rucker Canyon in the Arizona Chiricahua Mountains. Chihuahuan shiner (*Notropis chihuahua*) is found in the park but nowhere else in the United States. Other native fish species include spotted gar (*Lepisosteus oculatus*), fathead (*Pimephales promelas*) and roundhouse minnows (*Dionda episcopa*), speckled chub (*Macrhybopsis*), longnose dace (*Rhinichthys cataractae*), Mexican tetra (*Astyanax mexicanus*), plains killifish (*Fundulus zebrinus*), western mosquitofish (*Gambusia affinis*), redhorse (*Moxostoma austrium*, *M. congestum*), and several species of shiner (Wauer and Fleming 2002). Generally these fish species live in a variety of habitats, including clear to moderately turbid, vegetated waters of shallow lakes, swamps, and reservoirs, in addition to main channels, tributaries, and sand-bottomed pools and backwaters of major river systems. Warm water with slow to moderate current is generally preferred (NatureServe 2010; TPWD 2009). Spawning typically occurs in the spring and summer for the majority of these fish species. Eggs are often laid in a nest in cavities or on gravel bottoms in shallow water, or deposited to float or adhere to gravel and/or aquatic plants (NatureServe 2010; TPWD 2009).

Several introduced species also inhabit the Rio Grande and its tributaries within the park, including threadfin shad (*Dorosoma petenense*), common carp (*Cyprinus carpio*), bass (*Micropterus salmoides*, *Morone chrysops*), bluegill (*Lepomis macrochirus*), sunfish (*Lepomis cyanellus*, *Lepomis microlophus*), warmouth (*Lepomis gulosus*), and tidewater silverside (*Menidia beryllina*) (Wauer and Fleming 2002).

SPECIAL-STATUS SPECIES

There are several federal- and state-listed wildlife species known to inhabit the park. However, many listed species are not located near the Boquillas crossing and/or the Rio Grande floodplain. The proposed project would not likely impacts these species. As a result, only species associated with the Boquillas crossing area are identified in this chapter and analyzed in “Chapter 4: Environmental Consequences.” Table 6 identifies special-status species associated with the Boquillas crossing. This includes species likely to inhabit or with the possibility to inhabit Boquillas crossing or its vicinity. Information in this table is based on state and federal species lists, as well as general knowledge of and observations by park staff with the park.

TABLE 6. FEDERALLY- AND STATE-LISTED SPECIES POTENTIALLY ASSOCIATED WITH THE BOQUILLAS CROSSING¹

Common Name	Scientific Name	Status ²		Presence
		State	Federal	
Mammals				
Spotted bat	<i>Euderma maculatum</i>	T	—	Dispersed over entire area
White-nosed coati	<i>Nasua narica</i>	T	—	Rare in Rio Grande corridor
Birds				
Yellow-billed cuckoo	<i>Coccyzus americanus</i>		C	Scattered along river; use sufficient riparian habitat and irrigation in area
Gray hawk	<i>Buteo albicaudatus</i>	T	—	Erratically nests at Rio Grande Village; hunts river corridor
Zone-tailed hawk	<i>Buteo albonotatus</i>	T	—	Hunts parkwide
Common black-hawk	<i>Buteogallus anthracinus</i>	T	—	Nests at Rio Grande Village; hunts river corridor
American peregrine falcon	<i>Falco peregrines</i>	E	—	Aeries downstream in Boquillas Canyon; hunts river corridor
Reptiles and Amphibians				
Reticulated gecko	<i>Coleonyx reticulatus</i>	T	—	Extremely rare parkwide
Trans-Pecos black-headed snake	<i>Tantilla cucullata</i>	T	—	Rare and widely dispersed over park area
Fish				
Big Bend gambusia	<i>Gambusia gaigei</i>	E	E	East side of Rio Grande Village in springs and ponds
Rio Grande silvery minnow	<i>Hybognathus amarus</i>	E	EXPN, XN	Inhabit river near project site
Mexican stoneroller	<i>Campostoma ornatum</i>	T	—	Rare in Rio Grande River

Common Name	Scientific Name	Status ²		Presence
		State	Federal	
Blue sucker	<i>Cycleptus elongates</i>	T	—	Present in Rio Grande River
Chihuahua shiner	<i>Notropis Chihuahua</i>	T	—	Rare in Rio Grande River
Invertebrates				
Texas hornshell (mussel)	<i>Popenaias popeii</i>	T	C	Sparse in Rio Grande River
Salina mucket	<i>Potamilus metnecktayi</i>	T	—	Sparse in Rio Grande River

Note: Information in this table was provided by Big Bend National Park staff.

¹Species associated with Boquillas crossing include species known to or with the possibility to inhabit the vicinity.

²Status: E – endangered; T – threatened; C – candidate; EXPN, XN – experimental population, nonessential

FEDERALLY-LISTED SPECIES

Under the *Endangered Species Act* (ESA) of 1973, the NPS has the responsibility to address impacts to federally listed threatened, endangered, and candidate species. The terms “threatened” and “endangered” describe the official federal status of certain species in the park as defined by the ESA. The term “candidate” is used officially by the USFWS when describing species the USFWS has sufficient information on biological vulnerability and threats to support issuance of a “proposed rule to list,” but issuance of the proposed listing rule is precluded by higher listing priorities. While listing actions of higher priorities advances, the USFWS works with several private and government agencies to carry out conservation actions for these species to possibly eliminate the need for listing. Federally-listed species are afforded legal protection under the ESA; therefore, sites supporting these species must be identified.

Big Bend Gambusia (*Gambusia gaigei*) – Endangered

First listed as federally endangered in 1967, the Big Bend gambusia is a small, live-bearing fish reaching approximately 2 inches (5.1 centimeters) long (TPWD 2009). Historically, it inhabits only spring habitats near the Boquillas crossing and Rio Grande Village. Habitats originally occupied by the Big Bend gambusia were marshes and natural pools with clear, shallow water fed by warm springs (Campbell 2003). The only wild population exists in a refugium pond located in the park (TPWD 2009). Although the present refugium has open water in excess of three feet, the fish are most abundant among the cattails and muskgrass near the shore (Campbell 2003).

All present populations of the Big Bend gambusia consist of descendants of three fish (two males and one female) taken from the declining Rio Grande Village population in 1956. The major threats to this species and other desert spring fishes include habitat loss from declining spring flows and reduced surface waters, competition with introduced species, and hybridization with introduced fishes (TPWD 2009). Installation of future facilities and water use to support visitor services will require careful planning to avoid overburdening available groundwater sources in the Rio Grande Village area (USFWS 1984).

Rio Grande Silvery Minnow (*Hybognathus amarus*) – Endangered

Listed as an endangered species in 1994 (USFWS 2010a), the Rio Grande silvery minnow reaches approximately 5 inches (12.7 centimeters) in total length (73 FR 74358-59). It requires low-velocity habitats with a sandy and silty substrate generally associated with a meandering river, including side channels, oxbows, and backwaters (73 FR 74359). The Rio Grande silvery minnow is rarely found in habitat with high water velocities, such as main channel runs, which are often deep and swift. The species is most commonly found in depths of less than 7.9 inches (20 centimeters) in the summer and 12.2 to

15.75 inches (31 to 40 centimeters) in the winter (USFWS 2010a). It is capable of withstanding many of the natural stresses of the desert aquatic environment; however, its maximum documented longevity in the wild is about 25 months, and very few survive more than 13 months (73 FR 74359).

The Rio Grande silvery minnow was historically one of the most abundant and widespread fishes in the Rio Grande Basin, occupying approximately 2,400 miles (3,862 kilometers) of river in New Mexico and Texas. It was found in the Rio Grande from Española, New Mexico, through Texas to the Gulf of Mexico. It was also found in the Pecos River, a major tributary of the Rio Grande, from Santa Rosa, New Mexico, downstream to its confluence with the Rio Grande in Texas. Currently, the Rio Grande silvery minnow is only found in one reach of the Rio Grande in New Mexico; a 174-mile (280-kilometer) stretch of river from Cochiti Dam to the headwaters of Elephant Butte Reservoir. Its current habitat is limited to about seven percent of its historical range (USFWS 2010a). The Rio Grande silvery minnow was extirpated from the Big Bend reach of the Rio Grande (73 FR 74359) until its reintroduction in December 2008 (USFWS 2010a). Silvery minnows were reintroduced into the Rio Grande near Big Bend as a nonessential experimental population under section 10(j) of the ESA (73 FR 74357). The nonessential experimental population area is located (1) in the Rio Grande, from Little Box Canyon downstream of Fort Quitman, Hudspeth County, Texas, through Big Bend National Park and the Rio Grande Wild and Scenic River, to Amistad Dam; and (2) in the Pecos River, from its confluence with Independence Creek to its confluence with the Rio Grande (USFWS 2010a). The Rio Grande silvery minnow is known to inhabit the Rio Grande near the proposed project site (table 6).

Throughout much of its historic range, the decline of the Rio Grande silvery minnow may be attributed in part to the destruction and modification of its habitat due to dewatering and diversion of water, water impoundment, and river channelization. Other contributing factors include predation by introduced nonnative species and water quality degradation (USFWS 2010a). Critical habitat for this species was designated in 2003, which encompasses 157 miles (252 kilometers) of the middle Rio Grande in New Mexico (68 FR 8088). Therefore, no critical habitat exists for this species within the park boundary.

Yellow-billed Cuckoo (*Coccyzus americanus*) – Candidate

The yellow-billed cuckoo is currently listed as a candidate species under the ESA. This medium-sized bird weighs approximately 2 ounces (60 grams) (USFWS 2010b) and averages 10.5 to 12.5 inches (26 to 32 centimeters), with a wingspan of 17 inches (43 centimeters). The varied diet of the yellow-billed cuckoo includes insects, bird eggs, snails, small frogs, lizards, berries, and some fruit (TPWD 2009).

Yellow-billed cuckoos are Neotropical migrants ranging throughout North, Central, and South America (TPWD 2009; USGS 2006b). They migrate to North America during the summer months, but winter in South America. This species can be seen in Texas from April through November (TPWD 2009). The yellow-billed cuckoo is a confirmed nesting species in the park and is known to live in river floodplain habitat, such as the Rio Grande, its corridor, tributaries, and isolated ponds (USGS 2006b). The yellow-billed cuckoo is known to breed in large blocks of riparian habitats, particularly woodlands with cottonwoods (*Populus fremontii*) and willows (*Salix* spp.). Dense understory foliage appears to be an important factor in nest site selection (USFWS 2010b). Nests generally consist of a flimsy shallow platform of twigs, lined sparingly with dried leaves or strips of bark, and placed on the branch of a small tree or larger shrub (Cornell Lab of Ornithology n.d.).

Destruction of native riparian habitat at its breeding grounds in North America and its wintering habitat in South America is a limiting factor for this species (TPWD 2009). Primary causes of riparian habitat losses are conversion to agricultural and other uses, dams and river flow management, stream channelization and stabilization, and livestock grazing. Available breeding habitats for these species have also been substantially reduced in area and quality by the replacement of native riparian habitats by invasive

nonnative plants, particularly tamarisk (*Tamarix* spp.). Disturbance regimes imposed by humans (i.e., water diversion, flood control, woodcutting, and vegetation clearing) have facilitated the spread of tamarisk. Conversion to tamarisk usually coincides with reduction or complete loss of bird species strongly associated with cottonwood-willow habitat, including the yellow-billed cuckoo (USFWS 2010b).

Texas Hornshell Mussel (*Popenaias popeii*) – Candidate

The Texas hornshell mussel (hornshell), a bivalve mollusk (having a two-halved shell), can grow as long as 7 inches (17.8 centimeters) and uses a muscular foot on the inside of its two shells for movement. Mussels are filter feeders, taking bacteria, algae, tiny animals, and organic detritus from the water by siphoning action. This species normally inhabits narrow areas of rivers and streams with travertine bedrock and fine-grained sand, clay or gravel on the bottom. They favor undercut banks, crevices and bases of big boulders where the current is slowed, allowing the mussels to get a safe foothold and not be washed away in times of high water (New Mexico Department of Game and Fish [NMDGF] n.d.).

Male hornshells release a ball of sperm into the river current, which then are inhaled by females downstream during their filter feeding, and eggs are fertilized internally. Females release larvae, called glochidia, into the current to find certain suitable host fish species to continue development. After a few weeks, the tiny glochidia develop a foot, release from the host fish, and settle at the bottom of the stream or pond (NMDGF n.d.).

The park began conducting bank searches for mussels starting in 2005 and has found 48 dead Texas hornshells, many of them recently dead, in the Rio Grande within the park, and in the lower canyons area of the Rio Grande Wild and Scenic River downstream of the park. This information indicates there are likely extant populations in this reach of the Rio Grande (USFWS 2010c).

Filter-feeding mussels are very sensitive to environmental degradation and serve as indicators of aquatic ecosystem health (NMDGF n.d.). Texas historically held an abundant and diverse assemblage of freshwater mussels, with 52 species present in state waters. Dramatic declines have been documented in the past two decades, to a level of such significance that many rivers and streams no longer support native freshwater mussel populations (USFWS 2010). Reasons for decline in freshwater mussel populations include: changes in flow waters of rivers and streams due to droughts, floods, or building dams; increased deposition of soft silt due to excessive run-off; scouring of stream beds during storm events; increased amounts of aquatic vegetation; lack of suitable native fish hosts for the larval stage; and aquatic contaminants (TPWD 2008). Groundwater depletion and exotic species are further threats to mussel communities (NMDGF n.d.).

STATE-LISTED SPECIES

NPS policy requires state-listed species and others identified as species of management concern by the park to be managed in parks in a manner similar to federally-listed species. NPS cooperates in the protection and enhancement of special status species listed by states. Within the park, 12 state-listed animal species, including mammals, birds, reptiles, fish, and invertebrates, have been identified as living or potentially living near the Boquillas crossing (table 6).

Mammals

In Texas, the spotted bat (*Euderma maculatum*) is listed as threatened and documented in only a few records in Brewster County. The spotted bat is distributed in a broad and extremely patchy area and highly associated with prominent rock features. It was found in extreme, low-desert habitats to high-elevation forests (TPWD 2009). Spotted bats prefer to roost on rock-faced cliffs and are thought to have

noncolonial specific roost. In the park, the spotted bat is dispersed over the area near the Boquillas crossing (Skiles, personal communication, 2011).

The white-nosed coati (*Nasua narica*) is also state listed as threatened. Coatis inhabit woodland areas and spend considerable time on the ground. They also inhabit some of the rocky canyons by entering the mountains from the lowlands (Museum of Texas Tech University n.d.). In the park, this species may only be an occasional wandering migrant individual or bands of males from northern Mexico (Wauer and Fleming 2002). It is considered rare in the Rio Grande corridor (Skiles, personal communication, 2011).

Birds

The gray hawk (*Buteo albicaudatus*) is a Neotropical migrant found from the southwestern United States to northern Argentina and Paraguay. Habitat varies from open thorn-scrub and savanna to tropical forest edges and clearings (Bibles et al. 2002). In the park, this rare species lives in lowland habitats along the Rio Grande (Wauer and Fleming 2002). It erratically nests at Rio Grande Village and hunts the river corridor (Skiles, personal communication, 2011).

The zone-tailed hawk (*Buteo albonotatus*) inhabits arid, semi-open country (particularly open deciduous or pine-oak woodland) often nesting in tall trees along streams (Cornell Lab of Ornithology n.d.). Within the park, this hawk is a confirmed nesting species found in river floodplain, grassland, and pinyon-oak-juniper woodland habitats (USGS 2006b). Although uncommon (USGS 2006b), the zone-tailed hawk hunts parkwide (Skiles, personal communication, 2011).

The common black hawk (*Buteogallus anthracinus*), a riparian nester in the southwestern United States, favors remote, mature gallery forest corridors along perennial streams (Schnell 1994). In the park, this migratory species frequents the river floodplain and pinyon-oak-juniper woodlands (USGS 2006b). Although rare (USGS 2006b), the common black hawk nests at Rio Grande Village and hunts the river corridor (Skiles, personal communication, 2011).

American peregrine falcon (*Falco peregrinus*) is a resident of the Trans-Pecos region, including the Chisos, Davis, and Guadalupe mountain ranges (TPWD 2009). It is found in a variety of habitats, most with cliffs for nesting and open areas for foraging. Peregrine falcons search for prey from perches or while flying, diving from high above and striking prey with their feet (Cornell Lab of Ornithology n.d.). Within the park, the peregrine falcon hunts the river corridor and is found in eyries downstream in Boquillas Canyon (Skiles, personal communication, 2011).

Reptiles and Amphibians

Only found in Presidio and Brewster Counties, Texas, the reticulated gecko (*Coleonyx reticulatus*) inhabits lowland desert outcrops. This nocturnal species is considered extremely rare parkwide (USGS 2006c).

According to the park staff, the Trans-Pecos black-headed snake (*Tantilla cucullata*) is rare and widely dispersed throughout the park (Skiles, personal communication, 2011). Most specimens have been encountered in steep-sided rocky canyons of the park at elevations between 5,400 and 5,600 feet (1,651 to 1,712 meters), where the dominant vegetation consisted of pinyon pine, juniper, and oak (Dixon and Werler 2005).

Fish

The Mexican stoneroller (*Campostoma ornatum*), blue sucker (*Cycleptus elongatus*), and Chihuahua shiner (*Notropis chihuahua*) are all native fish inhabiting the Rio Grande (Skiles, personal communication, 2011; Wauer and Fleming 2002). The Mexican stoneroller is found in the United States only from the park area and Rucker Canyon in the Arizona Chiricahua Mountains. Chihuahua shiner is considered rare in the Rio Grande along the park southern boundary, but is found nowhere else in the United States. The blue sucker prefers swift currents of the Rio Grande (Wauer and Fleming 2002).

Invertebrates

The currently understood distribution of the salina mucket (*Potamilus metnecktayi*) includes flowing streams and rivers with sand and gravel substrates. In Texas, this species inhabits the Rio Grande near the park downstream to Falcon Dam (Edwards Aquifer Recovery Implementation Program [EARIP] 2010). This mussel is considered sparse in the Rio Grande (Skiles, personal communication, 2011).

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

GENERAL ANALYSIS METHOD

Impact analyses and conclusions included in the environmental review are based on data and other pertinent information found in existing literature, information and insights provided by NPS experts and other agencies, and professional judgment.

For each impact topic, a brief description of relevant components of the existing condition is provided. This information is then used as a basis for determining the effects of implementing each of the action alternatives. For each resource topic, impact analyses involved the following steps:

- **Define issues of concern** based on findings from internal and external (or public) scoping
- Identify the geographic area that could be affected
- **Define the resources** within that area that could be affected
- **Impose the alternative on the resources** within the geographic area of potential effect
- **Identify the effects** caused by the alternative, in comparison to alternative A, the no action alternative, to determine the relative change in resource conditions. The effects of each are characterized based on the following factors:
 - Whether the effect would be beneficial or adverse.
 - The intensity of the effect, which are defined as negligible, minor, moderate, or major. Intensity definitions for such effects are provided in the discussion in the methodology section for each impact topic. Intensity definitions were developed based on federal and state regulations and standards, NPS policies, consultation with regulators from applicable agencies, and discussions with subject matter experts.
 - The duration of the effect, either short- or long-term, are described in the methodology section discussion for each impact topic.
 - The geographic extent of effects, which may vary by resource topic and/or alternative
 - Whether the effect would be a direct result of the action or would occur indirectly because of a change to another resource or impact topic.
- **Determine cumulative effects** by evaluating the effect in conjunction with past, present, or reasonably foreseeable future actions for Big Bend National Park and the immediate vicinity.

CUMULATIVE EFFECTS ANALYSIS METHOD

Sections 1508.7 and 1508.25 (a)(2) of CEQ regulations (1978) for implementing NEPA require an assessment of cumulative effects in the decision-making process for federal actions. Cumulative effects are defined as “the impact on the environment which results from the incremental impact of the action

when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions” (40 Code of Federal Regulations 1508.7).

NPS guidance on environmental impact analysis (NPS 2001, DO-12) is designed to evaluate cumulative effects in a way that helps to determine the additive impact of the alternative on each resource of concern. The guidance states “it is irrelevant who takes these actions (i.e., they are not confined to NPS or even federal activities), or whether they took place in the past, are taking place in the present, or will take place in the reasonably foreseeable future.”

Cumulative effects were determined by combining the effects of each alternative with other past, present, and reasonably foreseeable future actions. In doing so, it was necessary to identify other past, ongoing, or reasonably foreseeable future actions within Big Bend National Park and in the surrounding region. The following identifies other plans in and around the park.

RELATIONSHIP TO OTHER PLANS AND POLICIES

NPS PLANS AND PROJECTS

2004 Big Bend National Park General Management Plan

The 2004 Big Bend National Park General Management Plan (GMP) (NPS 2004d) was designed to offer an enhanced experience for visitors while creating a more suitable park and providing better protection for park resources. The goals and objectives outlined in the 2004 Big Bend National Park GMP will guide resource management and visitor experience in the park for the next 10 to 15 years. Under the 2004 Big Bend National Park GMP, a new visitor center could be developed and interpretive programming would be expanded. Interpretation would be developed for the Buttrill Spring area. Actions such as reducing irrigation water used at Rio Grande Village by 50 percent, phasing out heavy water-use plants at Rio Grande Village and Cottonwood Campground would also be implemented. This would effectively relocate personnel to gateway communities and remove some development from the Chisos Basin, which would reduce water use. All of these actions would increase the visitor experience while making the park more sustainable.

2005 Wildland Fire Management Plan

The 2005 Wildland Fire Management Plan (FMP) (NPS 2005) provides a framework for making fire-related decisions and serves as an operations manual. The FMP is designed to improve the protection of people, property, and resources within the park. The plan implements the policies and supports goals identified by national wildland fire management requirements.

Given the remoteness of the park from other firefighting resources in the United States, Mexican nationals from small villages near the border have assisted in the Big Bend National Park fire management program for the past two decades. In the event of a fire emergency, these nationals are permitted into the United States and protected from persecution for illegal entry into the country. There are approximately 30 men participating in the program. Firefighters are assigned to hand crews named “Los Diablos” for their original promise to “fight fire like devils.” The program has served as a model of cooperation between agencies in the United States and Mexico.

Exotic Animal Management Plans and Environmental Assessments

Trespass livestock, primarily from Mexico, have long been an impact upon park resources, particularly along the Rio Grande. In recent decades, exotic Barbary sheep (Aoudad) and feral hogs have invaded the

park. The river zone has been invaded by nutria, bullfrogs and Elegant Sliders. The park is currently developing an EA to increase trespass livestock control efforts and to begin controlling Barbary sheep and feral hogs. The EA will include studies to evaluate control options for aquatic invasive species and is expected to be complete in 2012.

1997 Recreational River Use Management Plan

The 1997 Recreational River Use Management Plan (plan) (NPS 1997) serves as an amendment to the Backcountry Management Plan, which was approved in 1995. The plan assigns all backcountry areas in one of three zones – threshold, primitive, or wild management. The plan formalizes historic patterns of use and defines management strategies for each zone. Visitor use levels and densities are distinct in each zone, which facilitates a different type of visitor experience in each. The plan further discusses motorized and non-motorized boat usage and the limitations of such in the different zones. It also identifies fishing regulations, canyon and road access points, river launch points, human waste requirements, and recreation use limits including party size and number of launches per day in each zone.

2004 Rio Grande Wild and Scenic River General Management Plan

The goals and objectives outlined in the 2004 Rio Grande Wild and Scenic River General Management Plan (plan) (NPS 2004d) will guide resource management and visitor experience in the river corridor for the next 15 to 20 years. The plan establishes a permanent boundary for the WSR and protects outstanding scenic values of the river. The NPS recommended that Congress designate the upper segment of the Rio Grande within the park as a WSR. This would increase federal and state ownership along the river to more than 50 percent. Proposed actions would increase the visitor experience while protecting the outstanding qualities of the Rio Grande.

Proposed Wilderness Classification

In 1984, as required by the *Wilderness Act of 1964* (PL 88-577), the NPS published *Final Environmental Impact Statement, Proposed Wilderness Classification, Big Bend National Park, Texas* proposing 533,900 acres of the park be designated as wilderness and an additional 25,700 acres be designated as potential wilderness addition. Until Congress acts on this proposal, the NPS will manage the lands as wilderness.

Long-Range Interpretive Plan component of the 2004 Comprehensive Interpretive Plan

The Long-Range Interpretive Plan component of the 2004 Comprehensive Interpretive Plan (NPS 2004c) serves as the vision for the interpretive plan of the park for the next 5 to 10 years. It is designed to increase visitor understanding and appreciation of the significance of park resources, as well as provide opportunities for people to forge their own intellectual and emotional connections with the ideas and meanings inherent in the resources of the park. Interpretive programs, for the general audience and curriculum-based groups would be designed to inform visitors about the geology, ecosystem, and human history of the park.

2006 Drinking Water System for Rio Grande Village Environmental Assessment

The 2006 Drinking Water System for Rio Grande Village Environmental Assessment (NPS 2006b) addressed replacing the existing water system to meet safe and reliable water source requirements for Rio Grande Village. The project replaced an existing hot spring (spring 4) with a new water source for the Rio Grande Village. The project included conversion of a deep test well to the water supply well, construction of a chlorination building, appurtenant water lines, and accessories necessary to connect the new water

well to the existing storage and distribution system, and a radio telemetry system for remote monitoring and operation of the water supply system.

Riparian Vegetation Management

Ongoing riparian vegetation management supports natural processes by facilitating expansion and reestablishment of cottonwood groves in their historic locations along the Rio Grande and its tributaries. Such management policies would also combat nonnative invasive species such as saltcedar (also known as Tamarisk), which is known to evaporate significant amounts of water and has damaging erosive features.

2008 Construct New Housing and Operation Facilities Environmental Assessment

The 2008 Construct New Housing and Operation Facilities EA (NPS 2009c) evaluated the need for additional housing, office, and other facilities within the park. The assessment identified various locations where such facilities could be sited, their long-term need, and the need to provide NPS, concession, school, and Natural History Association housing and other facilities. The EA included the need to increase NPS and U.S. Border Patrol law enforcement services and facilities associated with U.S.–Mexico border security (NPS 2009c).

PROJECTS AND PLANS PROPOSED BY OTHER AGENCIES

The Merida Initiative: Expanding the U.S.–Mexico Partnership

This Merida Initiative is a unique and bold partnership between the United States and Mexico to fight organized crime and associated violence while furthering respect for human rights and the rule of law (Embassy of the United States 2011). The initiative coupled with its expansion called “Beyond Merida,” the United States has strengthened partnerships to improve citizen safety in affected areas to fight drug trafficking, organized crime, corruption, illicit arms trafficking, money laundering, and demand for drugs in both countries. The “Beyond Merida” initiative is accelerating efforts to make democratic institutions such as police, justice systems, and civil society organizations stronger to legitimate trade and travel between the United States and Mexico. The remote location of the park and rugged landscape make it an unwelcoming place for people engaging in criminal behavior to access. However, as a part of this initiative, law enforcement within the park will increase. The number of CBP agents in the park will increase from two to eight while the number of park rangers will increase from 15 to 23.

Big Bend–Rio Bravo Project

The mission of Big Bend–Rio Bravo Project is to increase cooperation and coordination between the parks and protected areas on both sides of the United States–Mexico border (NPS 2010s). Activities associated with the project would benefit both countries as the governments work together to recognize and designate the Big Bend–Rio Bravo area as a natural area of binational interest. Greater cooperation between and among staff and other personnel will result in improved conservation for numerous resource areas, including: biological monitoring; endangered species habitat conservation; climate change monitoring and adaptation; wildland fire management; and control of invasive species. Increased cooperation and coordination would also facilitate cohesive and consistent actions to restrict development of roads and other infrastructure, which would impede criminal activities and illegal movement of people through the area.

International Boundary and Water Commission, United States and Mexico

The mission of the IBWC, United States and Mexico, is to apply the rights and obligations that the governments of the United States and Mexico assumed under numerous boundary and water treaties and related agreements. The United States section of the IBWC (USIBWC) by virtue of the Treaty of February 3, 1944 (the 1944 Water Treaty) for “Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande” (TS 994; 59 Stat 1219), and agreements concluded thereunder by the United States and Mexico is responsible for ensuring that the United States government meets the obligations incurred in those agreements.

The November 23, 1970 treaty to resolve pending boundary differences and maintain the Rio Grande and Colorado River as the international boundary between Mexico and the United States, (23 U.S.T. 371, T.I.A.S. No. 7313) prohibits the construction of works that may cause deflection or obstruction of the normal flow of the river or its flood flows. The USIBWC required proposed construction or tree planting activities be accomplished without impeding or changing flows in the Rio Grande or alter historic surface runoff characteristics at the international border. This requirement is intended to ensure developments in one country will not cause damage to lands or resources in the other country.

Accordingly, all engineering drawings and any necessary supporting calculations as part of other plans for the park will be submitted to the USIBWC for review and approval before beginning work. The drawings and calculations will show the activities and construction will be undertaken without changing historic surface runoff characteristics. The NPS will continue to assure the USIBWC that structures constructed along the United States and Mexico border are maintained in an adequate manner and liability issues created by these structures are addressed.

Letter of Intent between the Department of the Interior of the United States and the Secretariat of Environment, Natural Resources, and Fisheries (SEMARNAP) of the United Mexican States for Joint Work in Natural Protected Areas on the United States-Mexico Border, Dated May 1997 (Identified as DOI-SEMARNAP LOI in text)

Under the May 1997 agreement the two agencies plan to expand cooperative activities in the conservation of contiguous natural protected areas in the border zone and to consider new opportunities for cooperation in the protection of natural protected areas on the United States–Mexico border. Among the listed areas are the wildlife protection areas in Mexico, including Maderas del Carmen in Coahuila and Cañon de Santa Elena in Chihuahua, and the adjacent protected area in the United States, which includes Big Bend National Park.

New Road from Chihuahua to Coahuila

Construction activities associated with the paving of a road from Coahuila and Chihuahua, two states in northern Mexico, are currently underway. The road will connect Musquiz, Coahuila to the Chihuahua highway south of Ojinaga, Chihuahua. In the Big Bend–Rio Bravo region, the proposed route would follow a historically unpaved road parallel to the United States–Mexico border. The proposed route would vary from between 15 and 40 miles south of the international boundary. The implementation of the proposed road is incremental and subject to funding uncertainties from the Mexican government. In recent years, approximately 80 miles of the road have been constructed and reach points south of Boquillas and Manuel Benavides, south of Lajitas, Texas. In Coahuila, progress has been made on the remaining unpaved sections. Approximately 100 miles remain to complete the connection between the two ends of the roadway. There is an unpaved spur road, approximately 33 miles long, from the newly paved road to Boquillas. There are currently no plans to pave this road (Skiles, personal communication, 2011).

IMPACT TOPICS

VISITOR USE AND EXPERIENCE

METHODS AND ASSUMPTIONS

Impacts to visitor use and experience were determined by considering the continuation of current management policies and existing conditions as compared to those actions associated with the proposed project. The continued closure of the border crossing at Boquillas would prohibit park visitors from frequenting the proposed project area, Boquillas, and other nearby areas in Mexico. The ability, or lack thereof, to engage in such activities may affect the overall visitor experience for some park patrons and could have an effect visitation numbers.

STUDY AREA

The study area for visitor use and experience will be inclusive of the entire park; however, the discussion and impact analysis will focus on those areas and visitor experiences near the proposed project area.

IMPACT DEFINITIONS

The following definitions were used to assess the intensity of adverse and beneficial impacts on visitor use and experience and duration of impacts:

- Negligible:* Visitors would likely be unaware of any change in management policies and regulations. There would be no noticeable change in visitor use and experience or in any defined indicators of visitor satisfaction or behavior.

- Minor:* Changes in visitor use or experience would be slight and detectable, but would not appreciably limit or enhance any critical characteristics of the visitor experience. Visitor satisfaction would remain stable.

- Moderate:* A few characteristics of the existing visitor experience would change, and the ability of visitors to engage in specified activities would be altered. Visitor satisfaction at the park would begin to either decline or increase.

- Major:* Many critical characteristics of the existing visitor experience would change, and visitor satisfaction would be substantially decreased or enhanced. The number of visitors engaging in a specified activity would be substantially altered.

- Duration:* Short-term impacts are defined as impacts that would occur during the implementation/construction of the proposed action alternative. Long-term impacts extend beyond the implementation of the action alternative.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis

There would be no change to visitor access or experience near the Boquillas crossing under alternative A. The site would remain closed to vehicular traffic and river crossings would be prohibited. Park staff estimate approximately 18,000 visitors frequented the Boquillas crossing annually before its closure (Elkowitz, personal communication, 2011). Therefore, these visitors would either visit other parts of the park or not frequent the park.

Park visitors, staff, researchers, and park and protected area managers would not be able to enter Mexico via the Boquillas crossing. The continued closure of the border at Boquillas would prohibit visitors from engaging in one of the historic visitor activities in the park (crossing the Rio Grande for leisure time in Boquillas, Mexico), which generally consists of frequenting local restaurants and conversing with and purchasing handicrafts from area residents. Under the no action alternative, long-term, localized, minor to moderate adverse impacts to visitor use and experience would result.

Cumulative Impacts

Past, present, and future projects in the park related to resource protection and the visitor experience have the potential to affect visitor use and experience in the park. The regulation of visitor activities helps ensure visitor safety while promoting a diverse range of experiences. Interpretative programs inform the public on the culture, geology, and history of the area, which enhance visitor opportunities. Programs designed to create a cooperative relationship between the United States and Mexico for protecting unique environmental features of the area also enhance visitor experience through resource protection. This includes the Merida Initiative, the Big Bend–Rio Bravo Project, and the DOI-SEMARNAP LOI. While public safety has not been a significant concern given the remote location of the park, any increase in law enforcement in the park and/or coordination between the United States and Mexico, may help improve potential visitors perception of safety in the area. This has the potential to increase visitation to the park.

The following discussion identifies plans and policies in and around the park designed to enhance the visitor experience. The 1997 Recreational River Use Management Plan formalizes historic patterns of use and defines management strategies for each zone. Visitor use levels and densities are distinct in each zone, which facilitates a different type of visitor experience in each. The regulation of visitor use levels and densities would result in long-term, beneficial impacts to visitor use and experience.

The 2004 Big Bend National Park GMP was designed to offer an enhanced experience for visitors while creating a more suitable park and providing better protection for park resources. The goals and objectives outlined in the 2004 Big Bend National Park GMP will guide resource management and visitor experience in the park for the next 10 to 15 years. Under the 2004 Big Bend National Park GMP, a new visitor center could be developed and interpretive programming would be expanded. Any increase in interpretive programs would result in long-term, beneficial impacts to visitor use and experience.

The 2004 Rio Grande Wild and Scenic River General Management Plan guides resource management and visitor experiences in the river corridor. It also establishes a permanent boundary for the WSR and protects outstanding scenic values of the river. The protection of outstandingly remarkable values of the river as part of the WSR designation enhances the visitor experience, resulting in long-term, beneficial impacts to visitor use and experience.

The Long-Range Interpretive Plan component of the 2004 Comprehensive Interpretive Plan serves as the vision of the interpretive plan for the park over the next 5 to 10 years. It is designed to increase visitor

understanding and appreciation of the significance of park resources as well as provide opportunities for people to forge their own intellectual and emotional connections with the ideas and meanings inherent in park resources. Interpretive programs, for a general audience and curriculum-based groups, will be designed to inform visitors about the geology, ecosystem, and human history of the park. Any increase in interpretative programs would result in long-term, beneficial impacts to visitor use and experience.

Fire suppression activities, as identified in the 2005 Big Bend National Park FMP, would improve the protection of people, property, and resources within the park. Any increase in the protection of visitors because of these activities would provide long-term, beneficial impacts to visitor use and experience.

Past, present, and reasonably foreseeable projects would result in long-term, beneficial impacts to the visitor use and experience. The no action alternative would result in long-term, minor to moderate adverse impacts to visitor use and experience. However, the combination of cumulative projects and the no action alternative would result in long-term, beneficial impacts to visitor use and experience as additional interpretative programs, law enforcement, and cooperative programs between the United States and Mexico are introduced within the park.

Conclusion

Under the no action alternative, long-term, minor to moderate adverse impacts to visitor use and experience would result. However, the combination of cumulative projects and the no action alternative would result in long-term, beneficial impacts to visitor use and experience as additional interpretative programs, law enforcement, and cooperative programs between the United States and Mexico are introduced within the park.

IMPACTS OF ALTERNATIVE B: PREFERRED ALTERNATIVE

Analysis

Under the action alternative, the Boquillas crossing would reopen, thereby permitting visitors, staff, and researchers to participate in one of the historic uses of the park. The existing access road to the proposed project area would reopen to visitors. The reintroduction of visitor activities in the proposed project area is anticipated to provide secure border access to Mexican Protected Areas for 18,000 to 25,000 visitors per year (NPS 2011c).

The proposed action alternative would permit park visitors, staff, researchers, and park and protected area managers to enter Mexico via the Boquillas crossing. Park visitors could cross the river to enjoy leisure time in Boquillas, or embark on a more extensive visit into the Maderas del Carmen. While in Mexico, visitors may elect to frequent local restaurants and/or converse with and purchase handicrafts from area residents. The ability to cross the Rio Grande at this location would facilitate one of the historic uses in the area, and would restore a long cherished cultural experience enjoyed by park visitors. This would result in long-term, beneficial impacts to visitor use and experience.

Cumulative Impacts

For this impact topic, the same projects included under the no action alternative are also considered under the action alternative. Past, present, and reasonably foreseeable projects in and near the park would result in long-term, beneficial impacts to the visitor use and experience. The implementation of the proposed action alternative would further enhance the visitor experience. Therefore, cumulative projects in combination with the action alternative would result in long-term, beneficial impacts to visitor use and experience.

Conclusion

The reopening on the proposed project area and the Boquillas crossing to visitors would enhance the visitor experience in the park. Therefore, the proposed action alternative would result in long-term, beneficial impacts to visitor use and experience. Cumulative projects in and near the park were designed to enhance visitor use and overall park experience. When combined with the proposed action alternative, cumulative projects related to visitor use and experience would result in long-term, beneficial impacts.

SOCIOECONOMICS

METHODS AND ASSUMPTIONS

Socioeconomic data and planned and proposed projects in and near the park as identified by NPS staff were considered in identifying and discussing the potential for socioeconomic effects of project alternatives. Planning team members applied experience and professional expertise and judgment to analyze potential impacts that would result from project alternatives on the existing social and economic conditions near the project area.

STUDY AREA

The study area for the socioeconomic impact analysis includes Brewster County, Texas, particularly those communities near the Boquillas crossing, such as Rio Grande Village, as they are the most likely to benefit from spending attributable to increased visitation and legal passage into the park by Mexican residents with proper documentation. The analysis will also consider the social and economic effects of the proposed action in Boquillas, the small community just south of the Rio Grande and Boquillas crossing in Mexico.

IMPACT DEFINITIONS

The following definitions were used to assess the intensity of adverse and beneficial impacts on socioeconomics and duration of impacts:

- Negligible:* Very few individuals, businesses, or government entities would be impacted. Impacts would be nonexistent, barely detectable, or detectable only through indirect means and with no discernable impact on local or regional economic conditions.
- Minor:* A few individuals, businesses, or government entities would be impacted. Impacts would be small but detectable, limited to a small geographic area, comparable in scale to typical year-to-year or seasonal variations, and not be expected to substantively alter economic conditions over the long term.
- Moderate:* Many individuals, businesses, or government entities would be impacted. Impacts would be readily apparent and detectable across a wider geographic area and may have a noticeable effect on economic conditions over the long term.

Major: A large number of individuals, businesses, or government entities would be impacted. Impacts would be readily detectable and observed, extend across much of the study area, and would have a substantial influence on economic conditions over the long term.

Duration: Short-term impacts are defined as impacts that would occur during the implementation/construction of the proposed action alternative. Long-term impacts would extend beyond the implementation of the action alternative.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis

Under the no action alternative, the continued closure of the border at Boquillas would prohibit park visitors, staff, researchers, and park and protected area managers from entering Mexico at this location. As mentioned in the Visitor Use and Experience section, park staff estimate approximately 18,000 people visited the Boquillas crossing and surrounding area before the border closure in May 2002. The loss of such visitation has adversely affected social and economic conditions of Brewster County businesses, the park concessionaire, and Boquillas residents.

The Money Generation Model from the Department of Parks, Recreation and Tourism Resources at Michigan State University estimates that approximately \$1.46 million in spending has been lost in Brewster County since the border closure. Additionally, the park concessionaire estimates a \$270,000 (in 2009 dollars) decrease in annual revenue from the loss of visitor spending and purchases made by Boquillas residents. Both of these trends would continue under the no action alternative.

In addition to the economic loss incurred by local businesses and Mexican residents because of the border closure, the social implications of such actions have generated other adverse impacts. Communities on either side of the Rio Grande have grown together over the years, enduring hardship and celebrating times of prosperity as one. The relationships forged by people in these communities acknowledge and celebrate the remote and unique environment that has continued over the years. Management policies under the no action alternative would continue to divide the communities once living in harmony on either side of the Rio Grande in the Boquillas area. Boquillas residents are unable to engage in historic activities in the area, such as the selling of handicrafts, which has affected their social and economic livelihoods. As a result, the population of Boquillas has declined, as has overall prosperity of the village. Therefore, continued closure of the Boquillas crossing under the no action alternative would result in long-term, minor to moderate adverse social and economic impacts to local businesses and communities near the proposed project area.

Cumulative Impacts

Past, present, and future projects in the park related to the visitor experience have the potential to affect social and economic conditions in communities in and around the park. Activities that would enhance the visitor experience and potentially increase visitation to the park would also result in economic benefits to businesses in Brewster County. Plans and programs designed to enhance the visitor experience, which could result in an increase in visitation and visitor spending, include: the 2004 Big Bend National Park GMP; the 2005 Big Bend National Park FMP; the 1997 Recreational River Use Management Plan; the

2004 Rio Grande Wild and Scenic River GMP; and the Long-Range Interpretive Plan component of the 2004 Comprehensive Interpretive Plan.

Initiatives designed to enhance coordination and cooperation between the United States and Mexico in efforts to protect the fragile ecosystem in areas of binational interest also have the potential to enhance and increase visitor opportunities in the area. Such initiatives include the Merida Initiative, the Big Bend–Rio Bravo Project, and the DOI-SEMARNAP LOI. Any increase in visitation because of such initiatives would likely increase spending near the proposed project area, resulting in long-term, beneficial socioeconomic impacts.

Conclusion

Under the no action alternative, the park concessionaire would continue to experience the loss in revenue generated by park visitors who previously visited the Boquillas crossing and Boquillas residents purchasing goods and services. Visitors would not be able to visit Boquillas nor eat and purchase goods and services from area residents. Any increase in visitation to the area as a result of cumulative projects would likely result in beneficial impacts by the park concessionaire. Because the border would remain closed, Boquillas residents would not experience economic benefits from any change in visitation.

IMPACTS OF ALTERNATIVE B: PREFERRED ALTERNATIVE

Analysis

Under alternative B, the proposed project area and the Boquillas crossing would reopen to visitors. Park staff estimate between 18,000 and 25,000 people per year would visit the area under the action alternative (NPS 2011c). The following presents an overview of estimated spending in Brewster County and Boquillas from the change in visitation should the proposed project be implemented. The analysis also considers visitor spending and purchases made by Mexican nationals at the park concessionaire.

Annual visitation to the park is broken down by type of visitor (i.e., local day trips, non-local trips, overnight hotel stays, and camping) to estimate spending in Brewster County. Percentages presented in the table were applied to anticipated visitation numbers to estimate spending in Brewster County under the action alternative. Under the action alternative, it has been estimated park visitors would introduce between approximately \$1.46 million and \$2.02 million in the Brewster County economy (see table 7).

Revenue generated at the park concessionaire considers spending by park visitors and Mexican residents who purchase goods and services. The park concessionaire, located in Rio Grande Village, estimates a \$270,000 (in 2009 dollars) decrease in annual revenue from the loss of visitor spending and purchases made by Boquillas residents, who represent approximately 40 percent of total spending (see “Chapter 3: Affected Environment”). Using these assumptions, average spending at the park concessionaire is estimated at \$9 per visitor. Therefore, the introduction of approximately 18,000 to 25,000 visitors per year to the proposed project area would generate between \$162,033 and \$225,046 in revenue at the park concessionaire.

Before the border closure, estimates indicate that Mexican residents spent approximately \$108,022 at the park concessionaire. Park staff estimate the population of Boquillas has decreased by approximately two-thirds since the border closure. Under the action alternative, it is estimated the Boquillas population, now two-thirds smaller than in 2002, would purchase approximately \$35,650 in goods and services at the park concessionaire. Under the action alternative, total spending at the park concessionaire is estimated to range from between \$197,681 and \$260,694.

TABLE 7: ESTIMATED VISITOR AND RESIDENT SPENDING IN THE PARK AND BOQUILLAS

Projected Visitors to Boquillas Crossing	Spending in the park	Park Concessionaire	Spending in Boquillas*		Total Visitor and Resident Spending
			\$5 per Visitor	\$15 per Visitor	
18,000	\$1,457,100	\$197,681	\$90,000	\$270,000	\$1,744,781 to \$1,924,781
21,500	\$1,740,425	\$229,187	\$107,500	\$322,500	\$2,077,112 to \$2,292,112
25,000	\$2,023,750	\$260,694	\$125,000	\$375,000	\$2,409,444 to \$2,659,444

Source: Elkowitz, personal communication, 2011. NPS 2011c. The Louis Berger Group, Inc., 2011.

*Spending per visitor in Boquillas is presented as a range and is to be used as only an estimate of spending per visitor; actual spending may be lower or higher than estimates presented.

Lastly, the analysis considers spending by park visitors in Boquillas. Assuming each visitor spends between \$5 and \$15 in Boquillas, annual spending by visitors introduced to the area because of the proposed project would range from \$90,000 to \$375,000. Under the action alternative, total spending in Brewster County and Boquillas as well as the park concessionaire would range from \$1.74 million to \$2.66 million depending on visitation numbers and overall spending patterns. Long-term, minor to moderate economic benefits would be borne by local communities and businesses because of the action alternative.

The reopening of the border at the Boquillas crossing would allow residents on either side of the border to interact with their neighbors. Under the action alternative, the long-respected relationship between these communities would be restored and the historic social interaction between and among peoples would be rejuvenated. The implementation of the proposed action alternative would result in long-term, beneficial social impacts to individuals and communities on either side of the border at the Boquillas crossing.

Cumulative Impacts

For this impact topic, the same projects included under the no action alternative are also considered under the action alternative. Past, present, and reasonably foreseeable projects in and near the park would result in long-term, beneficial socioeconomic impacts in the park and greater Brewster County should visitation increase. In combination with the proposed project, the implementation and success of plans and policies to protect areas of binational interest would be eased and could result in social and economic benefits should visitation increase. Under the proposed project, communities in Brewster County and Boquillas would benefit from increased coordination and visitation anticipated by cumulative projects considered in this analysis. Therefore, cumulative projects in combination with the action alternative would result in long-term, beneficial impacts to socioeconomics and transboundary conditions.

Conclusion

Under the action alternative, the long-respected relationship between communities on either side of the river at Boquillas would be restored and the historic social interaction between and among peoples would be rejuvenated. The implementation of the proposed action alternative would result in long-term, beneficial social impacts to individuals and communities on either side of the border at the Boquillas crossing. Under the proposed project, cumulative projects in combination with the action alternative would result in long-term, beneficial impacts to socioeconomics and transboundary conditions.

PUBLIC HEALTH AND SAFETY

Methodology

The analysis of public health and safety considers risks to the public and NPS staff associated with hazards in the project area and the proposed project. Impacts for this resource area were analyzed qualitatively, using information provided by NPS staff familiar with current management policies and the objectives of the proposed project.

Study Area

The study area for this impact analysis includes the park in its entirety; however, the assessment pays particular attention to areas near the proposed project area. It is anticipated that effects to public health and safety associated with the proposed project would be generally limited to these areas. The cumulative impacts analysis, however, is inclusive of an area larger than the park. The study area for the cumulative impacts analysis includes areas in northern Mexico that could have a bearing on public health and safety in the park.

Impact Thresholds

The following definitions were used to assess the intensity of adverse and beneficial impacts on public health and safety and duration of impacts:

Negligible: Impacts on public health and safety would not be measurable or perceptible.

Minor: Impacts on public health and safety would be measurable or perceptible, but it would be limited to a relatively small number of visitors or employees at localized areas. Mitigation could be needed, but would include measures relatively easy to implement and likely to be successful.

Moderate: Impacts on public health and safety would be measurable or perceptible and would affect a notable share of park visitors or employees. Mitigation measures would probably be necessary and would likely be successful.

Major: Impacts on public health and safety would be substantial. Incidents would increase in the short term and long term. Extensive mitigation measures would be required and their success would not be guaranteed.

Duration: Short-term impacts are defined as impacts that would occur during the implementation/construction of the proposed action alternative. Long-term impacts extend beyond the implementation of the alternative.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis

Under the no action alternative, the proposed project area would remain closed to vehicular movements and would continue to experience low visitation numbers. The gate along the existing dirt road would

continue to restrict vehicular access to the site. Because there would be no change in visitation to proposed project area under the no action alternative, there would be no change to public health and safety over existing conditions.

No cameras or other security measures would be implemented and, therefore, under the no action alternative, monitoring of the proposed project area, either by camera or CBP agents, would not occur. Because the Boquillas crossing and roadway access to the proposed project area are closed to visitors on either side of the border, the area is not generally considered a risk to public health and safety. Therefore, no adverse impacts to public health and safety would be borne by the no action alternative.

Cumulative Impacts

Past, present, and future projects in and around the project area could affect public health and safety in the proposed project area. The 1997 Recreational River Use Management Plan formalizes historic patterns of use and defines management strategies for each zone. The plan defines use limits and visitor regulations by zone. The regulation of certain recreational river uses and the limits of such may result in a decrease in visitor incidents on the river. Any decrease in the number of visitor incidents would result in long-term, beneficial impacts to public health and safety.

The 2006 EA for the drinking water system at Rio Grande Village identified the need to replace the existing water system to meet the requirements of a safe and reliable water source in Rio Grande Village. The replacement of the water well would ensure safe drinking water for park visitors in and around Rio Grande Village. Improvements would result in long-term, beneficial impacts to public health and safety.

The 2008 Construct New Housing and Operation Facilities EA identified the need for new facilities to accommodate an increase in law enforcement and enhanced visitor opportunities. Any increase in law enforcement in the park would result in long-term, beneficial impacts to public health and safety for park visitors.

The Merida Initiative, a unique and bold partnership between the United States and Mexico, is designed to fight organized crime and associated violence while furthering respect for human rights and the rule of law. The remote location of the park and rugged landscape make it an unwelcoming place for people engaging in criminal behavior to access. Because of the initiative, however, the number of CBP agents and NPS park rangers in the park would increase. Any increase in law enforcement in the park would result in long-term, beneficial impacts to public health and safety.

The Big Bend–Rio Bravo Project and the DOI-SEMARNAP LOI would increase cooperation and coordination between the parks and protected areas on both sides of the United States–Mexico border. Increased cooperation and coordination between the two nations in and around the park would result in long-term, beneficial impacts to public health and safety for park visitors.

A new road from Coahuila to Chihuahua would run approximately 33.5 miles south of Boquillas. While there are currently no plans to pave the spur road up to Boquillas, the ease at which travelers could access the area would improve. This may result in an increase of the number of people visiting Boquillas, and while not anticipated, there could be an increase in criminal activity in the area because of the new paved road. The ease at which people, particularly those engaged in criminal activity, access the Boquillas area could result in long-term, negligible to minor adverse impacts to public health and safety for park visitors should there be spill-over into the United States.

Past, present, and reasonably foreseeable projects in combination with the no action alternative would result in long-term, beneficial impacts to public health and safety.

Conclusion

Because the proposed project area would remain closed to vehicular traffic and continue to be a low visitation area, there would be no change to public health and safety over existing conditions. Cumulative impacts on public health and safety would be long-term and beneficial.

IMPACTS OF ALTERNATIVE B: PREFERRED ALTERNATIVE

Analysis

The implementation of the proposed project would result in the reopening of the existing road and project area to visitors. Not unlike other areas of the park open to visitors, the implementation of the proposed project puts the project area on the list of places where a visitor incident could occur. It is not anticipated visitor incidents in the project area would be high given the topography of the area and low-impact activities that would occur in the project area.

The implementation of the proposed project includes the installation of 24-hour camera surveillance and other security measures to monitor activity at the Boquillas crossing. CBP agents and other law enforcement personnel would be able to monitor activity at the Boquillas crossing, which under the no action alternative remains unchecked. The installation of such equipment would result in long-term, beneficial impacts to public health and safety.

Cumulative Impacts

For this impact topic, the same projects included under the no action alternative are also considered under the action alternative. The increased presence of CBP agents and NPS park rangers as part of the Merida Initiative coupled with CBP agents and 24-hour video surveillance implemented as part of the proposed project would result in long-term, beneficial impacts to public health and safety. Past, present, and reasonably foreseeable projects in combination with the no action alternative would result in long-term, beneficial impacts to public health and safety.

Conclusion

The implementation of the proposed project would result in long-term, beneficial impacts to public health and safety because of increased law enforcement presence and 24-hour video surveillance. Cumulative impacts on public health and safety would result in long-term, beneficial impacts.

PARK OPERATIONS AND MANAGEMENT

Methodology

Park operations and management, for this analysis, refers to the quality and effectiveness of park staff to maintain and administer park resources and provide for an appropriate visitor experience. The impact analysis is based on the current description of park operations presented in “Chapter 3: Affected Environment.”

Study Area

The study area for the park operations and management impact analysis includes the park in its entirety, as a change in management policies has the potential to affect the ability of park staff to maintain and administer park resources and provide for an appropriate visitor experience.

Impact Thresholds

The following definitions were used to assess the intensity of adverse and beneficial impacts on park operation and management and duration of impacts:

- Negligible:* No measurable effect on park operations and management in the park unit would result from project alternatives.
- Minor:* Effects to park operations and management would not be readily apparent and difficult to measure. Any such effects on park operations and management would have little material effect on other ongoing park operations.
- Moderate:* Effects to park operations and management would be readily apparent and measurable by park staff and visitors. Mitigation measures would likely be necessary and are anticipated to be successful.
- Major:* Effects to park operations and management would be readily apparent and would result in a substantial change to current park operations. Such changes would be noticeable to park staff and visitors and be markedly different from existing operations. Mitigation measures would be necessary, and their success could not be guaranteed.
- Duration:* Short-term impacts would occur during the implementation/construction of the proposed action. Long-term impacts would occur during the operation of the proposed action.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis

Under the no action alternative, current management policies associated with the closure of the crossing at Boquillas would continue. Visitor services, amenities, and interpretive information near the proposed project site would not occur and access to the site would continue to be restricted. No impacts to park operations and management would occur.

Cumulative Impacts

Past, present, and reasonably foreseeable future projects in the park related to resource protection or development in or around the project area could affect park operations and management. The 2004 Big Bend National Park GMP and the 2005 Big Bend National Park FMP, the 1997 Recreational River Use Plan, the exotic animal management plans and EAs, and the Long-Range Interpretive Plan component of the 2004 Comprehensive Interpretive Plan guides management decisions for protection of park resources, visitor experience, and fire suppression activities, which would result in long-term beneficial impacts to park operations and management.

The Merida Initiative is a partnership between the United States and Mexico set to fight organized crime and associated violence along the border. As part of this initiative, law enforcement in the park would increase. The number of CBP agents in the park has been identified to increase from two to eight agents while the number of park rangers has been identified to increase from 15 to 23. It is anticipated some

additional law enforcement agents sited in the park would be located in or near the proposed project area. This would result in long-term, beneficial impacts to park operations and management.

The Big Bend–Rio Bravo Project and DOI-SEMARNAP LOI were designed to increase cooperation and coordination in areas of binational interest to protect the fragile ecosystem. The implementation and success of such initiatives would improve park operations and management.

Past, present, and reasonably foreseeable projects in combination with no effects of the no action alternative, would result in long-term, beneficial impacts to park operations and management.

Conclusion

Under the no action alternative, there would be no change in existing park operations and management. Past, present, and future projects would result in long-term, beneficial impacts to park operations and management.

IMPACTS OF ALTERNATIVE B: PREFERRED ALTERNATIVE

Analysis

Under the proposed project, park visitors, staff, researchers, and Mexican nationals with appropriate documentation would be permitted to enter the United States at the Boquillas crossing. While there would be an increase in human activity at this currently closed location, the increase in law enforcement and 24-hour video surveillance in the proposed project area would result in long-term, beneficial impacts to park operations and management. The inclusion of interpretative services at the proposed visitor contact station would support the park mission to educate the public on the ecological history and cultural significance of the area. Such services would be provided by park staff. This would result in long-term, beneficial impacts to park operations and management.

Cumulative Impacts

For this cumulative impacts analysis, past, present and reasonably foreseeable plans and projects would be the same as those described under the no action alternative. The combination of increased law enforcement as part of the Merida Initiative and implementation of the proposed project would result in additional law enforcement in the park, resulting in long-term, beneficial impacts to park operations and management. Numerous plans and projects in the park have identified the need for additional visitor services such as interpretive programs. These services, combined with interpretive programs identified as part of the proposed project, would result in long-term, beneficial impacts to park operations and management.

Conclusion

The increase in law enforcement and interpretive services as part of the proposed project would result in long-term, beneficial impacts to park operations and management. Additionally, the increase in law enforcement as part of the Merida Initiative and interpretive services as part of the 2004 Big Bend National Park GMP and the Long-Range Interpretive Plan component of the 2004 Comprehensive Interpretive Plan when combined with components of the action alternative would result in long-term, beneficial impacts to park operations and management.

WILD AND SCENIC RIVERS

METHODOLOGY AND ASSUMPTIONS

The portion of the Rio Grande near the proposed project area is classified as scenic (see “Chapter 3: Affected Environment”). This analysis evaluates the potential for project alternatives to affect the characteristics of the Rio Grande contributing to classification or eligibility of the river as a WSR river. Such characteristics include the free-flowing nature of the river and the outstandingly remarkable values (historic resources, geologic, scenic resources, wildlife/fish, and recreation) provided by the river and adjacent lands.

STUDY AREA

The study area for the WSRs impact analysis includes portions of the river and floodplain located adjacent to the proposed project area. However, the cumulative impact analysis is inclusive of past, present, and reasonably foreseeable projects along the river corridor.

IMPACT THRESHOLDS

The following definitions were used to assess the intensity of beneficial and adverse impacts to the Rio Grande that may result from project alternatives and the duration at which point impacts would be either short or long term:

- Negligible:* The effect on the outstandingly remarkable values for which the river segment was determined eligible for listing as a WSR would be at the lowest levels of detection, barely measurable, with no perceptible consequences, either adverse or beneficial.
- Minor:* A perceptible effect would occur to one or more of the outstandingly remarkable values for which the river segment was determined eligible for listing as a WSR. Little, if any, loss of value or integrity would occur.
- Moderate:* A readily apparent effect would occur to the outstandingly remarkable values for which the river segment was determined eligible for listing as a WSR. The effect would diminish or enhance some of the values, but not enough to threaten the listing of the river in the National Wild and Scenic Rivers System.
- Major:* A readily apparent effect would occur to the outstandingly remarkable values for which the river segment was determined eligible for listing as a WSR. In the case of an adverse effect severe enough to threaten the eligibility of a segment for inclusion in the National Wild and Scenic Rivers System.
- Duration:* Short-term impacts are defined as impacts that would occur during the implementation/construction of the proposed action alternative and for a period of less than one month when the proposed project is in operation. Long-term impacts extend beyond the implementation of the action alternative.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis

The no action alternative represents a continuation of current management policies. No alteration would occur to the outstandingly remarkable scenic characteristics that contribute to classifying the study area as a WSR. In the study area, riprap previously used to support automobile crossings during low water flows would remain in place. The large stones and concrete material used for the riprap deflect and impede downstream flow. Such characteristics diminish scenic values of the river at this location (figure 17). The continuation of current management policies would allow the riprap to remain which would result in site-specific, long-term, negligible to minor adverse impacts on WSR values.



Source: NPS 2011a.

FIGURE 17. EROSION UPSTREAM NEAR THE FORMER AUTOMOBILE CROSSING AT BOQUILLAS

Cumulative Impacts

Past, present, and reasonably foreseeable future projects in the park related to resource protection or development in or around the project area could affect WSRs. The park's 1997 Recreational River Use Management Plan formalizes historic patterns of use and defines management strategies for each zone. The plan defines use limits and visitor regulations by zone. The 2004 Rio Grande Wild and Scenic River GMP guides resource management and visitor experience along the river corridor. The plan establishes a permanent boundary for the classified sections of the WSR and protects outstandingly remarkable scenic values of the river. It also recommends the designation of the upper segment of the Rio Grande within the park as part of the WSR. Actions associated with both plans that include the regulation of certain recreational river uses and the limits of such, as well as the application of a permanent WSR boundary

that is set up to limit land uses and development within the boundary result in long-term beneficial impacts to scenic values

The 2004 Big Bend National Park GMP was designed to offer enhanced experiences for visitors while providing protection of park resources, including those associated with the Rio Grande, resulting in long-term negligible to minor benefits to scenic values associated with the river.

Fire suppression activities, as identified in the 2005 Big Bend National Park FMP, are anticipated to enhance scenic values in the project area. The extent to which these benefits would be realized is dependent on the number of fires averted. The prevention of fire through tactics identified in the 2005 Big Bend National Park FMP would result in long-term beneficial impacts to scenic values in and around the project area. Exotic plant management plans would be used to manage exotic animals, trespass livestock, and exotic plants in the park while also protecting the park natural and cultural resources. The protection of these resources and the restoration of damaged areas would result in long-term beneficial impacts to scenic values.

One of the primary objectives of the IBWC is to increase relations between the United States and Mexico regarding resource protection. The Big Bend–Rio Bravo Project, would also help protect resources through the increased coordination and cooperation of lands that would be included as part of a natural area of binational interest. Any increase in the protection of resources, including the WSR, in and around the park would result in long-term beneficial impacts.

Conclusion

Scenic elements near proposed project area, such as the old riprap, would continue under the no action alternative as they do under existing conditions. This would result in site-specific long-term negligible adverse impacts to WSRs. Cumulative impacts on WSRs would be long-term, minor, and beneficial.

IMPACTS OF ALTERNATIVE B: PREFERRED ALTERNATIVE

Analysis

During construction activities associated with the proposed project, construction equipment would be present and possibly visible from the river. Therefore, scenic values in this portion of the project area would experience short-term negligible to minor adverse impacts. During construction activities, it is also anticipated wildlife near the proposed project area would avoid areas where noise would be increased. This would result in short-term negligible, adverse impacts. Such effects would terminate once construction activities are complete.

The proposed visitor contact center would be designed to be architecturally compatible to the nearby Barker House, located just east of the project area. The proposed visitor contact station would include solar photovoltaic panels and rainwater catchment areas. Some aspects of the proposed visitor contact station may be visible from the river; however, generally views of the visitor contact station from the river would be obstructed by landscapes and existing and planted vegetation. Because of this obstruction, the visitor contact station would have long-term, negligible adverse impacts on scenic resources. Views from the river of the pre-fabricated chlorine booster station would also generally be shielded by existing and planted vegetation and landscapes, resulting in long-term, negligible adverse impacts.

Under the action alternative, visitors would access the proposed project site via the existing closed road. Depending on one's location on the river, vehicles entering the proposed visitor contact station may be visible. The increase in vehicular movements associated with the proposed project would result in long-

term negligible to minor adverse impacts, the extent of which would depend on the number of automobiles, to scenic values.

The trimming of trees and removal of cane along the existing trail would result in long-term, negligible adverse impacts to scenic values. The width reduction of the existing trail would reduce its visibility from the river. This would result in long-term beneficial impacts to scenic values. The proposed shade structure to be sited at the edge of the river would be constructed with cedar and topped with cane, consistent with surrounding vegetation. However, the structure could be visible along the river resulting in long-term, negligible adverse impacts. When conditions are muddy, the placement of temporary, mobile, walking surfaces along the river would be visible from the river. This would result in periodic negligible adverse impacts over the long term.

The removal of existing riprap would improve water flow and free the shoreline of impoundments. This would result in a long-term, site-specific, beneficial impact. The construction of the visitor contact station is anticipated to increase the number of visitors crossing the Rio Grande at Boquillas. Due to the subjective nature of scenic values combined with the fact that the crossing would be reverted to its historical use, the increased cultural appeal of the area would result in long-term beneficial impacts.

Cumulative Impacts

Impacts of other past, present, and reasonably foreseeable future projects would be as described for alternative A – long-term and beneficial. In combination with the long-term benefits of the proposed action, overall cumulative impacts on WSR values would be localized, long-term, and beneficial.

Conclusion

Construction and operation of the action alternative would result in short- and long-term negligible to minor adverse impacts to the scenic values of the river. However, the removal of the old riprap, the reduction of the trail width, and the reintroduction of the historical use of the Boquillas crossing would result in long-term beneficial impacts to scenic values of the river. Cumulative impacts on WSRs would be long-term and beneficial, but limited.

WATER RESOURCES

METHODOLOGY

This analysis evaluates the potential for project alternatives to effect water resources near the proposed project area. Effects to water supply and quality are assessed. The analysis is based on recent site hydrological assessments, studies conducted within the general vicinity of the proposed project, and professional opinion of water resource experts.

STUDY AREA

The study area for assessing impacts to water resources includes the proposed project area and areas near the proposed project area that uses the same water resources. However, the cumulative impact analysis is inclusive of past, present, and reasonably foreseeable projects along the river corridor.

IMPACT THRESHOLDS

The following definitions were used to assess the intensity of beneficial and adverse impacts to water resources that may result from project alternatives and the duration at which point impacts would be either short- or long-term:

- Negligible:* Changes in water quality and supply would be within the natural range of variability. The designated beneficial, traditional, or ecological use of the water would not be affected.
- Minor:* Changes in water quality and supply would be detectable, but only slightly beyond the natural range of variability. The designated beneficial, traditional, or ecological use of the water would not be affected.
- Moderate:* Water quality and supply would be altered compared to natural baseline or desired water quality conditions. The designated beneficial, traditional, or ecological use of the water may be affected, but effects on human or wildlife use would not occur.
- Major:* Changes in water quality and supply would be readily measurable and would be altered from the natural baseline or desired water quality conditions. The designated beneficial, traditional, or ecological use of the water may be affected, and effects on human or wildlife use would potentially occur.
- Duration:* Short-term impacts are defined as impacts that would occur during the implementation/construction of the proposed action alternative. Long-term impacts extend beyond implementation of the action alternative.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis

Under the no action alternative, there would be no alteration to and/or demand for water resources. Current water quality conditions would continue.

Cumulative Impacts

Past, present, and future projects in the park related to resource protection or development in or around the project area could affect water resources. Water use in nearby Rio Grande Village is controlled by ongoing installation of low-flow fixtures and other water conservation measures designed to assure that demand on water resources does not exceed historic levels. Such measures enable the park to implement other proposed projects while not exceeding historic use levels. The following identifies projects within the cumulative impacts study area that could affect such resources.

The 2006 EA for development of the drinking water system for Rio Grande Village evaluated the need to replace the existing water system to meet the requirements of a safe and reliable water source in Rio Grande Village. Development of the Deep Fault Well as a new water source to meet the requirements of a safe and reliable water source resulted in long-term beneficial impacts to water supply and quality.

The 2004 Big Bend National Park GMP was designed to offer enhanced experiences for visitors while providing protection of park resources. The phasing out of plants heavily dependent on water resources

would increase water supply. The selected location and size of new facilities would determine the extent of additional demand on water resources. Increased water supply from the removal of plants with high water demand would result in long-term beneficial impacts while the construction and operation of new facilities could place additional demand on water resources. Measures to minimize the use of excess water would be implemented as part of new development, resulting in no net change of water use.

An increase in CBP agents and park staff because of the Merida Initiative could place additional demand on water resources if personnel live in the park. The 2008 New Housing and Operation Facilities EA recommended new facilities to enhance the visitor experience and to house additional law enforcement. Water conservation measures would be implemented to ensure historic use rates are not exceeded, resulting in no net effect on water quality and supply.

Riparian vegetation management seeks to reestablish native vegetation including cottonwoods while combating nonnative invasive species that place significant demands on water supply. The removal of such species would result in long-term beneficial impacts to water resources. Past, present, and reasonably foreseeable projects would result in long-term beneficial effects to water resources.

Conclusion

Under the no action alternative, there would be no change in the existing demand or quality on water resources. Past, present, and future projects would result in long-term, beneficial effects to water resources.

IMPACTS OF ALTERNATIVE B: PREFERRED ALTERNATIVE

Analysis

Construction activities associated with the action alternative, primarily grading and excavation require water to prevent excessive dust. Water would also be used for personal use by the construction staff. As a result, construction activities would result in short-term, negligible adverse impacts to water resources.

The estimated increase of between 18,000 and 25,000 visitors annually to the Boquillas area because the proposed project would place additional demand on the existing water supply. Such a change in demand would be attributable to restrooms and drinking fountains implemented as part of the proposed project. With implementation of water conservation methods including the installation of a rain water collection system for toilets and irrigation use, low-flow toilets and other fixtures increased demand would not exceed historic rates resulting in no measurable effect. In addition, water required for use in the septic tank, pump station and drainfield would not place demand on water resources that would exceed historic rates and would not contribute to water quality effects resulting in no measureable effect.

The use of a chlorine booster station would work to improve low chlorine residual concentrations of water near Berkley Cottage to levels of 0.2 mg/liter as mandated by the Groundwater Rule administered by the Texas Commission of Environmental Quality, resulting in long-term beneficial impacts to water quality.

Cumulative Impacts

Impacts of past, present and reasonably foreseeable future plans and projects would be as described for alternative A (long-term and beneficial). The action alternative would increase water demand however, past, present, and reasonably foreseeable projects have been designed to reduce water demand to historic levels. The introduction of the action alternative would be designed in such a way that historic water levels would not be exceeded and would result in no measureable impacts to water resources.

Conclusion

Construction activities associated with the action alternative would result in short-term negligible adverse impacts on water resources. The increase in visitation to the project area because the proposed project would place additional demand on existing water resources; however, the use of water conservation methods would not exceed historic rates resulting in no measureable effect. The use of a chlorine booster station would improve groundwater quality, resulting in long-term beneficial effects. Cumulative projects were designed to help decrease water demand to allow additional projects to be introduced in and around the project area to not exceed historic levels. As a result, cumulative projects would be long term and beneficial.

FLOODPLAINS

METHODOLOGY

This analysis evaluates the potential for project alternatives to affect floodplains near the proposed project area. The analysis considers the natural ability of the floodplain to handle a flood, effects of floodplain development upstream and downstream, and potential effects on development in and near a floodplain. In accordance with the NPS Director's Order 77-2, "Floodplain Management", a statement of findings for floodplains is included in appendix B.

STUDY AREA

The study area for the floodplains impact analysis includes lands in and immediately surrounding the proposed project area. The same geographic area is considered for cumulative impacts to floodplains.

IMPACT THRESHOLDS

The following definitions were used to assess the intensity of beneficial and adverse impacts to floodplains that may result from project alternatives and the duration at which point impacts would be either short- or long-term:

- Negligible:* Floodplains would not be affected; effects would be nondetectable and floodplain function would not be measurably affected or, if detected or affected, would be considered slight. A U.S. Army Corps of Engineers (USACE) 404 permit would not be necessary.
- Minor:* Effects on floodplains would be measurable although the effects would likely be small. Changes in floodplain function would be limited to the project site and adjacent areas. No mitigation measures associated with floodplains would be necessary. A USACE 404 permit would not be necessary.
- Moderate:* Effects on floodplains and floodplain function would be measurably altered in the project area and up and/or downstream in the river reach. Mitigation could be required and if implemented, would likely be successful. A USACE 404 permit could be required.

Major: Effects on floodplains and floodplain function would be readily measurable, would have substantial consequences, and would be observable in the project area and up and downstream through the river reach. The character of the floodplain would be changed so that functions typically provided by the floodplain would be substantially altered. Mitigation would be required and its success could not be assured. A USACE 404 permit would be required.

Duration: Short-term impacts are defined as impacts that would occur during the implementation/construction of the proposed action alternative. Long-term impacts extend beyond implementation of the action alternative.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis

Under the no action alternative, there would be no alteration to floodplains or floodplain function. Current floodplain conditions would continue.

Cumulative Impacts

Past, present, and future projects in the park related to resource protection or development in or around the project area could affect floodplains near the proposed project area. The 1997 Recreational River Use Management Plan formalizes historic patterns of use and defines management strategies for each zone. The Plan defines use limits and visitor regulations by zone. Use and limit restrictions have the potential to allow previously disturbed floodplain soils the chance to recover and may prohibit the development of structures or features that would hamper the ability of a floodplain to handle a flood resulting in long-term beneficial impacts.

The 2004 Rio Grande Wild and Scenic River GMP guides resource management and visitor experience along the river corridor. The Plan establishes a permanent boundary for the classified areas of the WSR and protects outstanding scenic values of the river. It also recommends the designation of the upper segment of the Rio Grande within the park as part of the WSR. The protection of scenic values as part of the WSR designation, the establishment of a permanent boundary, and the possible inclusion of the upper portion of the Rio Grande could prohibit future development within the floodplain, which would result in long-term, beneficial impacts.

The 2004 Big Bend National Park GMP was designed to offer enhanced experiences for visitors while providing protection of park resources, including those associated with the Rio Grande, resulting in long-term negligible to minor benefits to floodplain values. Past, present, and reasonably foreseeable projects would result in long-term, adverse negligible to minor effects to floodplains.

Conclusion

There would be no impacts to floodplains under the no action alternative. Cumulative effects on floodplains would be long-term and beneficial through allowing floodplain soils the opportunity to recover and by limiting future development in the floodplain. The no action alternative would not contribute to these impacts.

IMPACTS OF ALTERNATIVE B: PREFERRED ALTERNATIVE

Analysis

A review of the existing FEMA 100-year floodplain map and conversations with the park has confirmed that a portion of the proposed project may fall just within the floodplain (see Floodplains in “Chapter 3: Affected Environment”).

The construction of the visitor contact station and associated utilities including propane tanks and chlorine booster station could inhibit, somewhat, the ability of the site to disperse flood flows and energy, and floodplains functions of the site would be altered. The use of silt fencing would protect the project area from soil erosion and sediment control, and when combined with the relatively small size of the proposed visitor contact station, its proposed location which is potentially on the edge of the 100-year floodplain, and anticipated rare occurrence of flows reaching the site, the result of construction would be long-term negligible and adverse. During the 2008 flood, which was the highest in recorded park history, flood waters did not reach the proposed project site. At the boundary of the 100-year floodplain, flow volumes and speeds would be low, and there would be limited potential for the structure to exacerbate upstream or downstream ponding or other flood characteristics. The presence of the visitor contact station would have long-term, localized, negligible adverse impacts on floodplain functions and values.

The construction of the new trail and alterations made to the existing trail, parking lot, and access road occur on land that has been previously disturbed. No new land disturbance would be required and all alterations would use pervious surfaces. It is anticipated that no impacts to floodplains will occur because of these activities; however, if impacts occur they would be long term, negligible, and adverse.

The proposed shade structure to be sited along the riverbank has not designed to withstand high water flows. Therefore, in the event of a flood the structure would likely be removed by flood flows and would result in no effects to floodplains.

Cumulative Impacts

Impacts of past, present and reasonably foreseeable future plans and projects would be as described for alternative A (long-term and beneficial). In combination with the have negligible, localized, adverse effects on floodplain values and functions of the proposed action, overall cumulative impacts would be long-term and beneficial.

Conclusion

Construction staging and activities in the project area, including the compaction of floodplain soils and vegetation removal, decreases the ability of the area to withstand a flood in the short term and long term, resulting in short negligible adverse impacts. The construction of the visitor contact station within the 100-year floodplain would result in long-term negligible adverse impacts. Cumulative impacts would be long term and beneficial due to the limitation of development and use within the floodplain.

SOILS AND VEGETATION

SOILS

METHODOLOGY

Potential impacts were assessed based on the extent of disturbance to soils, including natural undisturbed soils, the potential for soil erosion resulting from disturbance, and limitations associated with soils. The analysis is based on information provided by the NPS, other agencies, and the professional judgment of subject matter experts.

STUDY AREA

The study area for the soils impact analysis includes areas where the construction and operation of the proposed project would occur. The analysis assumes that construction activities would not occur outside these areas. The study area for cumulative impact analysis includes the previously mentioned study area and to lands adjacent to the proposed project area.

IMPACT THRESHOLDS

The following definitions were used to assess the intensity of beneficial and adverse impacts to soils that may result from the project alternatives and the duration at which point impacts would be either short- or long-term:

- Negligible:* Soils and their productivity or fertility would not be affected, or the effects would be below or at levels of detection. There would be no discernable effect on the rate of soil erosion or the ability of the soil to support native vegetation.
- Minor:* The effects on soil productivity or fertility would be detectable. There would be detectable effects on the rate of soil erosion or the ability of the soil to support native vegetation.
- Moderate:* The effect on soil productivity or fertility would be readily apparent and would result in a change to the soil strata or chemistry. The rate of soil erosion or the ability of the soil to support native vegetation expected to be present in the area would be appreciably changed. Mitigation measures would be necessary to offset adverse impacts and would likely be successful.
- Major:* The effect on soil productivity or fertility would be readily apparent and would substantially change the character of the soils. The actions would have substantial, highly noticeable influences on the rate of soil erosion or the ability of the soil to support native vegetation expected to be present in the area. Mitigation measures to offset adverse impacts would be needed, would be extensive, and their success would not be guaranteed.
- Duration:* Short-term impacts are defined as impacts that would occur during or within one year of implementation/construction of the proposed action alternative. Long-term impacts extend beyond implementation of the action alternative.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis

No new disturbance of soils would occur under the no action alternative. Under the no action alternative, the old riprap along the river corridor previously used to support automobile crossings during low water flows would remain in place. The riprap, which was constructed with large stones and concrete material, deflects and impedes downstream flow. Flow deflection generates zones where scour and deposition occur in close proximity (USACE 2003). Upstream from the riprap, an area of riverbank scour and ponding has been created (figure 16). The structure, which is degraded, also likely produces irregular areas of deposition downstream. As long as the impediment to flow is present, it is anticipated that these erosion and deposition processes would continue. As a result, soils would continue to erode near the old riprap, which would result in site-specific, long-term, minor, and adverse impacts.

Cumulative Impacts

Past, present, and future projects within the park and the construction and operation of other facilities in and around the project area have the potential to affect soils within immediate proximity to the proposed project area. Past projects include the Long-Range Interpretive Plan component of the 2004 Comprehensive Interpretive Plan which identified interpretive programs for visitors to educate them about the unique qualities of the park. Increased programs and interpretive displays would result in long-term negligible to minor adverse impacts dependent on the types of programs implemented, the number of people walking throughout the area and the amount of soil affected from disturbance.

The 2004 Big Bend National Park GMP was designed to offer enhanced experiences for visitors while providing protection of parks resources. Objectives identified in the plan include the construction of numerous facilities designed to enhance the visitor experience. The construction and operation of facilities would result in either the disturbance or removal of soils, which would result in long-term negligible to minor adverse impacts, depending on the amount and type of soil affected.

Three exotic animal management plans and EAs would be used to manage exotic plants in the park while also protecting natural and cultural resources of the park. The removal of exotic plants associated with these plans, as well as riparian vegetation management would promote natural process and habitats resulting in long-term beneficial impacts.

The 2008 Construct New Housing and Operation Facilities EA identifies the needs for new facilities to enhance the visitor experience and to house additional law enforcement. The extent of disturbance caused by such actions will depend on where facilities are sited. Long-term negligible to minor adverse impacts to soils may result from such actions.

Cumulative impacts on soils would be long-term, negligible to minor and adverse. When combined with the localized long-term minor adverse impacts of the no action alternative, associated with the continued presence of riprap, overall cumulative impacts on soils would be long term, negligible to minor, and adverse. Impacts associated with the no action alternative would contribute only minimally to overall effects associated with soils.

Conclusion

Under the no action alternative features, the continued presence of the old riprap would result in long-term minor adverse impacts on soils. Impacts of other past, present and reasonably foreseeable actions

would be long-term, negligible to minor and adverse, only a portion of which would be attributable to the no action alternative.

IMPACTS OF ALTERNATIVE B: PREFERRED ALTERNATIVE

Analysis

The proposed project would require the disturbance of an area approximately 20,000 sq. ft. during construction activities. The majority of soils that would be affected by the proposed project are previously disturbed.

During construction activities, the soil layer structure would be disturbed and modified, and soils would be exposed, increasing the overall potential for erosion. Resource protection measures would include the employment of BMPs, including the use of silt fencing to prevent and control soil erosion and sedimentation during construction of the proposed project. Additionally, construction activities would adhere to an approved erosion and sediment control plan. Soils disturbed within the proposed construction area would be actively reseeded to stabilize the soil, repair compaction, and/or improve soil productivity. Short-term minor adverse effects to soils would result during the construction of the proposed project.

Impacts would be limited to the proposed location of the visitor contact station, parking lot, existing trail, proposed overlook and the majority of the area for utility trenching. In these areas, soils have been previously disturbed and filled with nonnative soils. Further disturbance to these areas would result in long-term, negligible, adverse impacts. The use of asphalt for ADA accessible parking and associated access aisle would increase the amount of impervious surface. The small scale of asphalt usage and the allowance of water runoff to sheetflow offsite would result in no effect from the use of impervious surfaces.

Construction activities associated with alternative B to undisturbed areas include the construction of the leach field and septic system and small portions of the water line in the immediate vicinity of these areas. The installation of a new septic system and leach field would require the use of class 1b soils suitable for use in a drainfield. These soils would be used as 2-foot-thick buffers, placed below and on all sides of the drainfield topped with one foot of native soil. This action permanently modifies the soil structure within the drainfield; however, the site would retain the capability to support native vegetation, resulting in site-specific long-term negligible adverse impacts.

The use of temporary portable walking surfaces along the river would be used when conditions are muddy, and the use of such would reduce the potential for erosion along the riverbank resulting in long-term beneficial impacts to soils by reducing erosion when soils are wet. In addition, the removal of the existing riprap in the river would decrease the potential for erosion along the riverbank, also resulting in long-term beneficial impacts.

Cumulative Impacts

Impacts of past, present and reasonably foreseeable future plans and projects would be as described for alternative A (long-term negligible to minor and adverse). Numerous facets of the action alternative occur on previously disturbed and filled soil, and when mixed with construction activities on undisturbed soil result in long-term negligible to minor adverse impacts. Cumulative impacts are long-term negligible to minor with the action alternative have a small contribution.

Conclusion

Impacts are limited to soils in previously disturbed areas resulting in long-term negligible adverse impacts. The construction of the leach field, septic tank, and small portion of the water line on undisturbed soils results in long-term minor adverse impacts. The removal of the riprap and use of temporary portable walking surfaces has the potential to reduce erosion along the riverbank resulting in long-term beneficial impacts. Cumulative impacts on the soils would be long-term, negligible to minor and adverse with the action alternative have a small contribution.

VEGETATION

METHODOLOGY

The potential for short- and long-term project-induced impacts on vegetation and vegetative communities for areas near the proposed project area were assessed based on existing conditions and cumulative projects within the park that may have an effect on these resources. The assessment is based on a review of available information from the NPS and other sources as well as the professional judgment of subject matter experts.

STUDY AREA

The study area identified for the impact analysis includes lands where construction and operation of the proposed project would occur. The analysis assumes that construction activities would not occur outside these areas. The study area for cumulative impact analysis includes areas that would be directly affected by the construction and operation of the proposed project and to lands adjacent to the proposed project area.

IMPACT THRESHOLDS

The following definitions were used to assess the intensity of beneficial and adverse impacts to vegetation and vegetative communities that may result from project alternatives and the duration at which point impacts would be either short- or long-term:

Negligible: Some individual native plants could be affected; however, measurable or perceptible changes in plant community size, integrity, or continuity would not occur.

Minor: Some individual native plants would be affected; however, a relatively small amount of the species' population would be impacted. The viability of the plant community would not be affected and, if left alone, would recover.

Moderate: Native plant species would be affected to the degree that changes would be readily measurable in terms of the abundance, distribution, quantity, or quality of a particular species. Mitigation measures may be necessary and would likely be successful.

Major: Considerable effects on native plant communities would be readily apparent, and would substantially change vegetation community types, abundance, distribution, quantity, and quantity. Mitigation measures to offset the adverse impacts would be required and extensive, the success of which would not be guaranteed.

Duration: Short-term impacts are defined as impacts that would occur during the implementation/construction of the proposed action alternative and for a period of approximately one year after such activities are complete. Long-term impacts would begin approximately one year after the implementation of the proposed action alternative.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis

Under the no action alternative, natural vegetation in the project area would remain undisturbed by human activity. The majority of land in the project area is previously disturbed. Under the no action alternative, the continued absence of human activity in this area would allow damaged vegetative communities the opportunity to recover and grow. Absent vegetative communities would have the opportunity to reemerge. As a result, the no action alternative would result in long-term beneficial impacts to vegetation and vegetative communities in the proposed project area.

Cumulative Impacts

Past, present, and reasonably foreseeable future projects in the park related to resource protection or development in or around the project area could affect vegetation and vegetative communities in and around the proposed project area. The following identifies projects within the cumulative impacts study area that could affect such resources.

Past projects include the completion of the Long-Range Interpretive Plan component of the 2004 Comprehensive Interpretive Plan. This project identified interpretive programs to inform visitors about the unique vegetative features found in the park. Educating visitors of such features would help protect resources and therefore result in long-term beneficial impacts to vegetative communities in the park.

Exotic animal management plans and EAs would be used to manage exotic plants in the park while also protecting the natural and cultural resources of the park. The removal and treatment of exotic plants and protection and restoration of native plant species would result in long-term beneficial impacts to vegetation and vegetative communities in and around the project area.

The 2004 Big Bend National Park GMP was designed to offer enhanced experiences for visitors while providing protection of park resources. Objectives identified in the plan include the phasing out of exotic plants heavily dependent on water to allow native vegetation to thrive in the area. This would result in long-term beneficial impacts to vegetation and vegetative communities throughout the park. The extent of impacts to vegetation and vegetative communities that may result from the construction and operation of new visitor facilities would be dependent on site selection. Impacts would be less should previously disturbed lands be selected during site evaluation. The construction and operation of such facilities would result in short- and long-term negligible to minor impacts, the extent of which would be based on site selection and project footprint. The extent of such impacts would also be applicable for facilities identified in the 2008 New Housing and Operation Facilities EA.

The 2005 Big Bend National Park FMP is expected to reduce the potential for a wildland fire through fire suppression tactics, thereby preventing the loss of vegetation and resulting in long-term beneficial impacts.

The DOI-SEMARNAP LOI and Big Bend–Rio Bravo Project identify the need to increase cooperation between the two nations regarding resource protection, including vegetative communities. Initiatives undertaken as part of these projects would result in long-term beneficial impacts to vegetation and vegetative communities in and around the project area.

Past, present, and reasonably foreseeable projects in combination with the no action alternative, would result in long-term beneficial impacts to vegetation and vegetative communities in and around the project area. The no action alternative would reinforce these impacts.

Conclusion

Under the no action alternative, vegetation and vegetative communities in the project area would continue to grow as they do under existing conditions. Cumulative impacts on vegetation and vegetative communities would be long-term and beneficial.

IMPACTS OF ALTERNATIVE B: PREFERRED ALTERNATIVE

Analysis

The construction of the proposed project would require an area of approximately 20,000 sq. ft. The majority of the project area is previously disturbed land.

The construction of the visitor contact station, parking area, overlook trail, and improvements to the access road would occur in previously disturbed areas with little to no vegetation. However, construction activities would require the removal of any vegetation found within the development footprint. Similarly, the proposed site of the water line trench would occur on lands that are primarily void of vegetation. A proposed construction staging area is to be sited on lands adjacent to the existing parking area entrance. This area is also previously disturbed, containing fill material and limited vegetation. To limit disturbance to vegetation in the proposed project area and to manage soil erosion and sediment during construction activities, BMPs including silt fencing would be used. Vegetation removed within the proposed construction area would be replanted. Providing access to the Rio Grande includes reduction of the trail width from 12 feet to 6 feet, providing a limited benefit to adjacent vegetation. Impacts to vegetation associated with these actions combined with the use of BMPs would be localized, short-term, and negligible.

The septic system drainfield would be located in previously undisturbed uplands just south of the visitor contact station. Installation of the 64-foot by 31-foot drainfield, pump station and septic tank would require the removal of existing vegetation and soils. Subsequent site rehabilitation would include use of native soils and vegetation. The operation of the leach field would support native vegetation on the site. The effects of the drainfield on vegetation would be localized, minor, adverse, and both short-term.

Because the majority of the proposed project area is previously disturbed and native vegetation would be replanted in instances of removal, impacts to vegetation and vegetative communities as a result of construction activities would be short-term negligible to minor adverse. Over the long term, impacts to vegetation and vegetative communities because of the proposed project would be negligible.

Cumulative Impacts

For this impact topic, the projects included under the no action alternative are also considered under the action alternative. Past, present, and reasonably foreseeable projects in combination with the action alternative would result in long-term benefits to vegetation and vegetative communities.

Conclusion

Construction activities associated with the proposed project would disturb and remove a limited amount of native vegetation, resulting in short-term, negligible to minor adverse impacts on vegetation. Overall cumulative impacts on vegetation would be long-term beneficial, with the proposed action making little contribution.

WILDLIFE AND WILDLIFE HABITAT, INCLUDING FEDERALLY- AND STATE-LISTED SPECIES

METHODOLOGY AND ASSUMPTIONS

Information on wildlife species occurring in the project area was based on review of existing literature on the area and consideration of common wildlife species likely to occur in the park. Analysis of potential impacts on wildlife was based on the potential for species to use the proposed project site. This section assesses the potential effects of the proposed Rio Grande border crossing between the United States and Mexico and visitor contact station in the project area.

STUDY AREA

The geographic study area for impacts on wildlife and wildlife habitat includes the project area for the proposed actions at Boquillas as well as associated areas that would be used as construction staging for equipment and supplies. It is expected that construction activities would not occur outside these areas. The study area for cumulative analysis includes the Big Bend National Park and immediately adjacent areas.

IMPACTS THRESHOLDS

The impact intensities for wildlife and wildlife habitat, including federally and state-listed species, were defined as follows:

- Negligible:* There would be no observable or measurable impacts on native species, their habitats, or the natural processes sustaining them. Impacts would be well within natural fluctuations.

- Minor:* Impacts would be detectable, but they would not be expected to be outside the natural range of variability of native species' populations, their habitats, or the natural processes sustaining them.

- Moderate:* Readily detectable impacts outside the range of natural variability would occur on native animal populations, their habitats, or the natural processes sustaining them. The change would be measurable in terms of population abundance, distribution, quantity, or quality, and would occur over a relatively large area. Mitigation to offset adverse impacts could be extensive, but would likely be successful.

- Major:* Readily apparent impacts outside the range of natural variability would occur on native animal populations, their habitats, or the natural processes sustaining them. The change would be measurable in terms of population viability and could involve the displacement, loss, or restoration of a wildlife population or assemblage. Mitigation measures to offset the adverse impacts would be required and would be extensive, and success of the mitigation measures would not be guaranteed.
- Adverse:* An adverse impact would occur when actions taken would directly harm or reduce native animal populations, their habitats, or the natural processes sustaining them to their preexisting condition.
- Beneficial:* A beneficial impact would occur when actions were taken to actively preserve, stabilize, or return native animal populations, their habitats, or the natural processes sustaining them to their preexisting condition.
- Duration:* Short-term impacts occur during the implementation of the alternative; long-term impacts extend beyond implementation of the alternative.

The impact intensities for federally-listed species were classified using the following terminology, as defined under the ESA:

No effect – The proposed action would not affect a listed species or designated critical habitat OR listed species or designated habitats are not present.

May affect / not likely to adversely affect – Effects on listed species are discountable (i.e., extremely unlikely to occur and not able to be meaningfully measured, detected, or evaluated) or completely beneficial.

May affect / likely to adversely affect – When an adverse effect to a listed species may occur as a direct or indirect result of proposed actions and the effect is either not discountable or completely beneficial.

Likely to jeopardize proposed species / adversely modify proposed critical habitat – The appropriate conclusion when NPS identifies situations in which actions could jeopardize the continued existence of a proposed species or adversely modify critical habitat to a listed species within and/or outside park boundaries.

WILDLIFE

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis

The no action alternative represents a continuation of current park policies and management. There would be no grading or excavation of soils or removal of vegetation because of this alternative, and the border crossing would remain closed. Implementation of the no action alternative would result in no effect on wildlife and wildlife habitat because no new disturbance would be introduced.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions, plans, and programs in the park and surrounding areas have affected or could affect wildlife and wildlife habitat. Past actions include park operations, prescribed fires, and restoration efforts. Park operations and developments within the park have resulted to increased area disturbance to wildlife and permanently removed wildlife habitat in portions of the park, specifically Rio Grande Village, resulting in short- and long-term minor adverse impacts. Although low-intensity prescribed burning degrades wildlife habitat over the period immediately following the burns, this action aims at improving habitat conditions over the long-term by restoring native grasses and sensitive wetland/riparian habitat. Therefore, the prevention of fire through tactics identified in the 2005 Big Bend National Park FMP would result in long-term beneficial impacts.

The park manages exotic animals, trespass livestock, and exotic plants in the park to protect park natural resources. Riparian vegetation management facilitates expansion and reestablishment of cottonwood groves in their historic locations along the Rio Grande and its tributaries, and combats nonnative invasive species such as tamarisk (*Tamarix* spp.), which is known to evaporate significant amounts of water and has damaging erosive features. The park has already been successful at reducing tamarisk's impact on park ecosystems. The park also manages for exotic ungulates (i.e., feral goats), to reduce the adverse impacts these species have on the native vegetation and habitat. Management activities have the potential to temporarily disrupt and displace native species from noise and the presence of staff associated with removal and monitoring efforts, resulting in localized short-term minor impacts adverse impacts depending on method of removal. However, the overall effect of removing exotic species from the park, as well as restoring previously disturbed land, would be long-term and beneficial, from restoration of native vegetation and species habitat.

The 1997 Recreational River Use Management Plan assigns all backcountry areas in one of three zones – threshold, primitive, or wild management. The plan addresses specific aspects of recreational use, including motorized and nonmotorized boat usage, fishing regulations, road access points, and recreation use limits. Although several management actions and activities related to recreational use could result in short- and long-term minor adverse impacts on wildlife and wildlife habitat, visitor use levels and densities are distinct in each zone, establishing a standard of habitat protection that results in long-term benefits for wildlife.

The 2004 Big Bend National Park GMP was designed to offer enhanced experiences for visitors while providing protection of parks resources. Objectives identified in the plan include the phasing out of plants that are heavily dependent on water and the construction of numerous facilities designed to enhance the visitor experience. The selected location of such facilities would determine the extent of potential long-term negligible to minor adverse impacts to wildlife and wildlife habitat. However, because the 2004 Big Bend National Park GMP (NPS 2004e) will guide resource management for the next 10 to 15 years, it is expected that the overall long-term impact on wildlife and wildlife habitat would be beneficial. Additionally, the focus on water conservation in the 2004 Big Bend National Park GMP would result in long-term benefits for species dependent on the riparian and wetland habitats within the park, specifically the endangered Big Bend mosquitofish, whose habitat and continued existence is dependent on the park's water supply.

The 2004 Rio Grande Wild and Scenic River GMP establishes a permanent boundary for the WSR and recommends that Congress designate the upper segment of the Rio Grande within the park as a WSR. Designated protection of segments of the Rio Grande would further benefit fish and other species dependent of riparian habitat. Additionally, until the proposed classification of 533,900 acres of the park as designated wilderness (with an additional 25,700 acres designated as potential wilderness addition) is approved, the NPS continues to manage those lands as wilderness. Although the Boquillas crossing is not

a part of the proposed wilderness, long-term benefits could result for more transient wildlife species that use floodplain and higher-elevation habitats.

In addition to water management efforts within the park, the IBWC ensures developments in one country will not cause damage to lands or resources in the other country. The mission of the IBWC and coordination and cooperation between the DOI and SEMARNAP would result in increased relations between Mexico and the United States regarding resource protection. The Big Bend–Rio Bravo Project would be the result of such coordination and cooperation. Designation of the Big Bend–Rio Bravo area as a natural area of binational interest would result in improved habitat conservation, biological monitoring, wildland fire management, and invasive species control. Any increase in the protection of resources in and around the park would result in long-term beneficial impacts to wildlife and wildlife habitat.

The Long-Range Interpretive Plan component of the 2004 Comprehensive Interpretive Plan identifies interpretive programs designed to increase visitor understanding and appreciation of the significance of park resources. Specifically, various interpretive programs would be designed to inform visitors about the diversity of life that the desert, mountain, and river ecosystems in the park support. The implementation of the park interpretive plan contributes to long-term beneficial impacts on wildlife and wildlife habitat.

Short- and long-term negligible to moderate adverse impacts would result from past, present, and future human activities on the landscape (inside and outside of the park), and the invasion and management of nonnative species. However, several plans and actions at the park, as well as agreements between the United States and Mexico, would result in species protection and restoration of native vegetation and associated habitat over the long term. Therefore, past, present, and reasonably foreseeable future actions on wildlife and wildlife habitat would result in long-term minor adverse and long-term beneficial impacts.

Conclusion

Under the no action alternative, existing use would continue in the project area, resulting in negligible effects on wildlife and wildlife habitat. The no action alternative would not contribute to cumulative impacts. Therefore, past, present, and reasonably foreseeable future actions on wildlife and wildlife habitat would result in long-term minor adverse and long-term beneficial cumulative impacts.

IMPACTS OF ALTERNATIVE B: PREFERRED ALTERNATIVE

Analysis

The action alternative proposes the construction and operation of a visitor contact station and Class B POE at the Boquillas crossing on the Rio Grande River in the park. During construction activities associated with this alternative, an area of approximately 20,000 sq. ft. would be used. The majority of this land is previously disturbed and would therefore avoid substantial alteration of the landscape and associated habitats. Construction activities associated with the visitor contact station and Class B POE would result in short-term minor adverse impacts on wildlife and wildlife habitat from species displacement and habitat disturbance. Additionally, areas used for equipment staging and storage could result in temporary disturbance and fragmentation of native habitat. However, proposed staging areas include existing roads, trails, utility routes, and parking areas that have been previously disturbed. It is expected that no new disturbance would be generated to meet the staging and storage needs of the project. Therefore, the impacts of equipment staging and storage sites on wildlife and wildlife habitat would likely be short-term, negligible to minor adverse.

The visitor contact station would be accessed from the main park road via an unpaved road, which is currently used by park staff as an access road. This road would be graded and new gravel would be

applied. The existing parking lot at this site would also be graded and graveled. Although activities associated with grading could result in temporary disturbance to native wildlife, adverse impacts would likely be short-term and negligible due to existing disturbance of these areas. Similarly, a graded, graveled walking trail to the top of the hill just south of the proposed visitor station would be constructed following a former road bed. Because no new land disturbance would occur, impacts on wildlife and wildlife habitat would likely be short-term, negligible adverse.

The presence of the visitor contact station and Class B POE would result in long-term minor adverse impacts to wildlife and wildlife habitat from potential species displacement and habitat fragmentation. Additionally, the increased presence of visitors in the area could disrupt wildlife, contributing to adverse impacts. Although the park is open 24 hours a day, the proposed hours of operation of the Class B POE and visitor station would be primarily limited to daylight hours. Therefore, adverse impacts that could result from visitor presence would be reduced in the evening and early morning, when nocturnal species are most active.

The installation of a leach field atop the adjacent hill would result in short-term minor adverse impacts to native habitat from temporary disruption. However, native vegetation would be allowed to reestablish on the site once native soil is used to fill the field and top off the system, resulting in long-term negligible impacts.

The existing trail from the parking area at the visitor contact station to the river would decrease in width by approximately half its current size, and would be stabilized by grading and adding a layer of gravel. Similar to other grading activities described under this alternative, impacts to wildlife and wildlife habitat are expected to be short-term negligible adverse. However, additional disturbance would occur from the trimming and removal of some vegetation to improve visibility of the trail from the river. Because the majority of vegetation would be retained, including mature trees along the access trail, adverse impacts to native wildlife habitat would likely be short term and minor.

Traditional methods of crossing the river, wading and boating, would be permitted. Driving across the river would not be permitted as it had been before the closure. Because of the shallow depth of the river and its historic use at the Boquillas crossing, impacts to aquatic species and habitat from river crossing would likely be long-term, minor adverse.

The use of temporary, mobile, walking surfaces when conditions are muddy would reduce the potential for erosion along the riverbank, resulting in long-term benefits to habitat along the river. Removal of the degraded riprap at the edge of the river would require the use of heavy machinery and would generate release sediment upon removal. Therefore, localized, short-term minor to moderate adverse impacts would result from disturbance of habitat and potential mortality of fish and aquatic invertebrates in the immediate vicinity. There is a possibility that minor loss of minnow habitat would occur following removal of the riprap; however, the impacts would be short-term negligible adverse because suitable habitat exists nearby and impacts would have no effect on populations. The long-term impacts of removing the riprap would be beneficial as the area would likely, over time, return to natural Rio Grande bank habitat.

Cumulative Impacts

The past, present, and reasonably foreseeable future actions, plans, and programs under action alternative would be the same as those described for no action alternative. The impacts of past, present, and future actions, when combined with the long-term minor adverse impacts of implementing the proposed project, would result in long-term minor adverse and long-term beneficial impacts on wildlife and wildlife habitat.

Conclusion

The implementation of the proposed project would result in localized short-term negligible to minor adverse impacts on native wildlife and wildlife habitat during implementation of management actions. However, following construction and grading activities, the presence of the contact visitor station and Class B POE would likely result in long-term minor adverse impacts from visitor presence and minor habitat fragmentation. When combined with the long-term minor adverse impacts of the proposed project, past, present, and reasonably foreseeable future actions would result in long-term minor adverse and long-term beneficial cumulative impacts on native wildlife and wildlife habitat.

FEDERALLY-LISTED SPECIES

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis

Because alternative A represents a continuation of current park policies and management, implementation of the no action alternative would have *no effect* on federally listed wildlife species found in the park, including Big Bend mosquitofish, Rio Grande silvery minnow, yellow-billed cuckoo, and Texas hornshell mussel.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions, plans, and programs affecting federally-listed species would be similar to those described for wildlife and wildlife habitat. Park operations and developments within the park have resulted in increased area disturbance to wildlife and permanently removed wildlife habitat in portions of the park, specifically Rio Grande Village, resulting in short- and long-term minor adverse impacts on the yellow-billed cuckoo and Big Bend mosquitofish. As described for wildlife and wildlife habitat, low-intensity prescribed burning degrades native habitat over the period immediately following the burns, resulting in potential short-term minor to moderate adverse impacts on suitable yellow-billed cuckoo habitat. However, this action aims at improving habitat conditions over the long-term by restoring native grasses and sensitive wetland/riparian habitat. Therefore, the prevention of fire through tactics identified in the 2005 Big Bend National Park FMP would result in long-term minor beneficial impacts on federally-listed species and their associated habitats.

As described for wildlife and wildlife habitat, the park is in the process of developing plans to manage exotic animals, trespass livestock, and exotic plants in the park. Management activities have the potential to temporarily disrupt and displace native species from noise and the presence of staff associated with removal and monitoring efforts, resulting in potential localized, short-term minor to moderate adverse impacts on federally-listed species. Additionally, short-term minor adverse impacts on federally listed aquatic species could result from the use of herbicides during exotic plant removal as described for wildlife and wildlife habitat. However, the overall effect of removing exotic species from the park, as well as restoring previously disturbed land, would be long-term moderate beneficial, from restoration of native vegetation and species habitat.

Although several plans within the park focus on visitor and recreational use, including the 1997 Recreational River Use Management Plan and 2004 Big Bend National Park GMP, they are also designed to ensure natural resource protection within the park. Several management actions and activities related to visitor and recreational use could result in short- and long-term negligible to minor adverse impacts on

federally-listed species. However, these plans establish a standard and framework for habitat protection resulting in long-term minor benefits for federally-listed species.

The focus on water conservation in the 2004 Big Bend National Park GMP would result in long-term minor to moderate benefits for federally-listed species dependent on the riparian and wetland habitats within the park, specifically the Big Bend mosquitofish, whose habitat and continued existence is dependent on the park's water supply. Continued use of Spring 4 as the source of potable water for Rio Grande Village would likely decrease available flows for the Big Bend mosquitofish. In response to this threat, and the need for a safe and reliable water source, the park drafted an environmental assessment in 2006 to evaluate the need for a new drinking water system at Rio Grande Village. Although the proposed project activities resulted in minor alteration of habitat and disturbance to other wildlife species during construction, conservation of the water supply provides long-term moderate benefits for the Big Bend mosquitofish, and other aquatic species, by reiterating the commitment between the NPS and USFWS that the NPS will not exceed the range of historical water use from the aquifer. Additionally, the park has committed to the USFWS to conduct long-term monitoring in order to determine whether the new well is or is not affecting flow from the spring head into mosquitofish habitat.

As described for wildlife and wildlife habitat, additional long-term minor to moderate benefits would result for federally-listed species from resource protection efforts, including water management efforts of the IBWC, increased relations between Mexico and the United States regarding resource protection, and designation of the Big Bend–Rio Bravo area as a natural area of binational interest. The park Long-Range Interpretive Plan of the 2004 Comprehensive Interpretive Plan would further enhance these efforts by identifying interpretive programs designed to increase visitor understanding and appreciation of the significance of park resources.

Short- and long-term negligible to moderate adverse impacts could result or have resulted from past, present, and future human activities on the landscape (inside and outside of the park), and the invasion and management of nonnative species. However, several plans and actions at the park, as well as agreements between the United States and Mexico, would result in species protection and restoration of native vegetation and associated habitat. Therefore, past, present, and reasonably foreseeable future actions in the park and surrounding areas would result in long-term minor adverse and long-term minor to moderate beneficial impacts on federally-listed species.

Conclusion

Under the no action alternative, existing use would continue in the project area, resulting in no effect on federally listed wildlife species. The no action alternative would not contribute to overall cumulative impacts. Therefore, past, present, and reasonably foreseeable future actions on federally-listed species would result in long-term minor adverse and long-term minor to moderate beneficial cumulative impacts.

IMPACTS OF ALTERNATIVE B: PREFERRED ALTERNATIVE

Analysis

Under the action alternative, potable water would be supplied from the park's Deep Fault Well and disinfection system that serves Rio Grande Village. The Deep Fault Well is also the source of water for Spring 4 in Rio Grande Village, which provides habitat for the Big Bend mosquitofish. Although using Deep Fault Well as the water source for the visitor contact station could indirectly affect habitat for this species, the proposed potable water system would use flow from the existing distribution system. The visitor contact station at the Boquillas crossing would be a LEED Silver sustainability plus building, which ensures specific features and systems are in place to further conserve water resources and limit

water use. Therefore, implementation of proposed project is *not likely to adversely affect* the Big Bend mosquitofish.

The Rio Grande silvery minnow requires low-velocity habitats with sandy and silty substrate generally associated with river side channels, oxbows, and backwaters (73 FR 74359). It is possible that silvery minnow habitat would be affected by the opening of the Boquillas crossing under the proposed project; however, the effects associated with the opening would be difficult to detect or evaluate, and would be discountable. Although the presence of this species is confirmed along this stretch of the Rio Grande, it is questionable whether this species inhabits the eddy created by the old crossing remnant. Although the eddy would disappear when the concrete riprap is removed, the habitat, at the scale the minnow operates, would not be affected. Therefore, implementation of the proposed project would have *no effect* on the Rio Grande silvery minnow. The concrete is interfering with normal hydrologic function and removal would yield greater positive impacts than leaving it. The long-term impacts of removing the riprap would be beneficial as a more natural river / bank integration would be restored, which benefits native aquatic species.

The yellow-billed cuckoo is a confirmed nesting species in the park and is known to breed in riparian habitats with cottonwoods and willows. Although riparian habitat exists in the project area, dense understory foliage is not characteristic of the area, which appears to be an important factor in nest site selection for this bird. Potential noise disturbance and habitat avoidance could result for the yellow-billed cuckoo from construction activities associated with the proposed project. However, because the cuckoo is a migrant species that winters in South America, it normally lives in Texas from April through November. Construction activities are planned to span October 2011 to April 2012. Therefore, impacts of construction-related activities on the yellow-billed cuckoo are expected to be short-term negligible adverse. The presence the visitor contact station and Class B POE following construction activities, as well as the increase in visitor use at the Boquillas crossing, could result in habitat avoidance and disturbance of nesting and foraging activities for the yellow-billed cuckoo. However, suitable nesting habitat exists for this species nearby along the floodplain of the river, such as Rio Grande Village, which is approximately two miles from the project area. Therefore, implementation of alternative B is not expected to result in detectable impacts to the yellow-billed cuckoo, and impacts would be discountable, resulting in a *not likely to adversely affect* Section 7 finding for this species.

As described in “Chapter 3: Affected Environment,” the Texas hornshell mussel normally lives in narrow areas of rivers and streams with travertine bedrock and fine-grained sand, clay or gravel on the bottom. This species favors undercut banks, crevices and bases of big boulders where the current is slowed (NMDGF n.d.). Although the placed riprap in the project area provides potential habitat for the Texas hornshell, bank searches for remnant shells have been conducted in the area. No populations have been confirmed in the area. It is possible that injury or mortality to one or two individuals may occur during removal of riprap at the Boquillas crossing, but impacts at the population level would be discountable. The long-term impacts of removing the riprap would be beneficial as a more natural river / bank integration would be restored, which benefits native aquatic species. Therefore, implementation of the proposed project *may affect or is not likely to adversely affect* the Texas hornshell mussel.

Cumulative Impacts

The past, present, and reasonably foreseeable future actions, plans, and programs under the proposed project would be the same as those described for the no action alternative. The impacts of past, present, and future actions, when combined with the long-term minor adverse impacts of implementing the proposed project, would result in long-term minor adverse and long-term minor to moderate beneficial impacts on federally-listed species.

Conclusion

Although species disturbance and very limited habitat loss and avoidance is possible under the proposed project, impacts to populations would be discountable. Therefore, implementation of the proposed project is not likely to adversely affect the Big Bend mosquitofish, Rio Grande silvery minnow, yellow-billed cuckoo, or Texas hornshell mussel. The proposed project would only contribute slightly to overall cumulative impacts. Past, present, and reasonably foreseeable future actions, when combined with the impacts of the proposed project, would result in long-term minor adverse and long-term beneficial cumulative impacts on federally-listed species.

STATE-LISTED SPECIES

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis

Implementation of the no action alternative would result in no effect on state-listed wildlife species because no new disturbance would be introduced.

Cumulative Impacts

Other past, present, and reasonably foreseeable future actions, plans, and programs affecting state-listed species would be the same as those described for wildlife and wildlife habitat. The impacts of past, present, and future actions would result in long-term minor adverse and long-term beneficial on state-listed wildlife species.

Conclusion

Under the no action alternative, existing use would continue in the project area, resulting in negligible effects on state-listed wildlife species and their associated habitat. The no action alternative would not contribute to overall cumulative impacts. Therefore, past, present, and reasonably foreseeable future actions on state-listed species would result in long-term minor adverse and long-term beneficial cumulative impacts.

IMPACTS OF ALTERNATIVE B: PREFERRED ALTERNATIVE

Analysis

As described for wildlife and wildlife habitat, construction activities associated with the visitor contact station and Class B POE, as well as the presence of equipment staging sites, would result in localized, short-term negligible to minor adverse impacts on state-listed species from potential displacement and habitat disturbance. Short-term adverse impacts would likely be negligible for state-listed fish and invertebrate species as their habitat would not be affected by staging and construction activities associated with the contact station and Class B POE.

Grading of the access road and parking lot could result in temporary disturbance to the state-listed reticulated gecko and Trans-Pecos black-headed snake, adverse impacts would likely be short-term and negligible due to the rarity of such species, as well as existing disturbance of these areas. Similarly, construction of a walking trail to the top of the hill just south of the proposed visitor contact station would

result in short-term negligible adverse impacts on state-listed wildlife species, because there would be no new land disturbance.

The presence of the visitor contact station and Class B POE would result in long-term minor adverse impacts to state-listed birds, mammals, and reptiles associated with the area, from potential species displacement and habitat fragmentation. Additionally, the increased presence of visitors in the area could disrupt sensitive birds hunting the river corridor, contributing to adverse impacts. Although the park is open 24 hours a day, the proposed hours of operation of the Class B POE and visitor station would be primarily limited to daylight hours. Therefore, adverse impacts that could result from visitor presence would be reduced in the evening and early morning, when the spotted bat, reticulated gecko, and Trans-Pecos black-headed snake are most active.

The installation of a leach field atop the adjacent hill would result in temporary disruption of native habitat. However, it is not likely that this area provides habitat for any state-listed species associated with the Boquillas crossing. Additionally, native vegetation would be allowed to reestablish on the site once native soil is used to fill the field and top off the system. Therefore, long-term negligible impacts on state-listed species are expected from installation of a leach field.

Similar to other grading activities under the proposed project, grading of the existing trail from the parking lot of the visitor contact station to the river would result in short-term negligible adverse impacts on state-listed species because of existing disturbance to the area. However, additional disturbance would occur from the trimming and removal of some vegetation to improve visibility of the trail from the river. Because the majority of vegetation would be retained, including mature trees along the access trail, adverse impacts to state-listed species would likely be short-term and minor.

As described for wildlife and wildlife habitat, impacts to aquatic state-listed species from river crossing would likely be long-term minor adverse because of the shallow depth of the river at the crossing and its historic use. The use of temporary, mobile, walking surfaces when conditions are muddy would reduce the potential for erosion along the riverbank, resulting in long-term benefits to habitat along the river. Removal of the degraded riprap at the edge of the river would result in localized, short-term minor to moderate adverse impacts from disturbance of habitat and potential mortality of fish and aquatic invertebrates in the immediate vicinity. There is a possibility that minor loss of minnow and mussel habitat would occur following removal of the riprap; however, the impacts would be short-term negligible adverse because suitable habitat exists nearby and impacts would have no effect on populations. The long-term impacts of removing the riprap would be beneficial as the area would likely, over time, return to natural Rio Grande bank habitat.

Cumulative Impacts

The past, present, and reasonably foreseeable future actions, plans, and programs under the action alternative would be the same as those described for no action alternative. The impacts of past, present, and future actions, when combined with the long-term minor adverse impacts of implementing the proposed project, would result in long-term minor adverse and long-term beneficial impacts on state-listed wildlife species.

Conclusion

The proposed project would result in localized short-term negligible to moderate adverse impacts on state-listed wildlife species and their associated habitats during implementation of management actions. However, following construction and grading activities, the presence of the contact visitor station and Class B POE, and the re-opening of Boquillas crossing would likely result in long-term minor adverse

impacts from visitor presence and minor habitat fragmentation. Past, present, and reasonably foreseeable future actions, in combination with the long-term minor adverse impacts of the action alternative, would result in long-term minor adverse and long-term beneficial cumulative impacts on state-listed wildlife species.

CHAPTER 5: CONSULTATION AND COORDINATION

One of the primary objectives of the NEPA is to encourage the participation in the assessment procedure by appropriate federal and state agencies and interested members of the public. This chapter describes the consultation that occurred during development of this EA. It also includes a description of public involvement processes employed to engage the abovementioned parties and a list of the recipients of the document.

THE SCOPING PROCESS

The NPS divides the scoping process into two parts: internal and external (or public) scoping. Internal scoping involved discussions among NPS personnel regarding the purpose of and need for management actions, issues and objectives, management alternatives, mitigation measures, the analysis boundary, the appropriate level of documentation, available references and guidance, among other topics.

External (or public) scoping is the early involvement of the interested and affected public in the environmental analysis process. Such a process helps ensure people have an opportunity to comment and contribute early in the decision-making process. For this planning document, project information was distributed to individuals, agencies, and organizations early in the project development process. Interested parties and individuals were given the opportunity to express concerns or views regarding the project, including identification of important issues and proposal of other project alternatives or components. These processes, internal and external (or public) scoping, are essential elements of the NEPA planning process. The following sections describe the various ways scoping was conducted for this EA.

INTERNAL SCOPING

An internal scoping meeting was held on January 12, 2011. Internal scoping leverages NPS staff to help determine which topics need to be analyzed in the EA. Based on the meeting and identified resource topics for inclusion in the EA, the interdisciplinary team defined the purpose, need, and objectives of the plan; identified potential issues; discussed preliminary alternatives; and defined data needs. Meeting results were captured in a report now on file as part of the administration record for this EA.

PUBLIC SCOPING

Public scoping efforts for this planning process focused on the means or processes designed and utilized to include the public, interest groups, and local public entities. To notify interested parties of the project, an informational brochure was mailed on February 15, 2011 to local businesses and land owners, federal, state, and county agencies; affiliated tribes; representatives of educational institutions; and nongovernmental organizations, as well as other people who expressed an interest in the project.

The brochure describes the EA process in addition to the preliminary purpose, need, objectives, and alternatives developed by the park staff during internal scoping. Information on how to comment was also provided. The brochure was posted on the NPS Planning, Environment, and Public Comment (PEPC) website (www.parkplanning.nps.gov/bibe) as well as the Big Bend National Park website (www.nps.gov/bibe/parkmgmt/publicinvolvement.htm). With the scoping brochure, the public was given 30 days to comment on the project from February 15, 2011 to March 16, 2011.

PUBLIC SCOPING COMMENTS

During the 30-day scoping period, 59 pieces of correspondence were received. All but two of the correspondences supported the proposed project. A few respondents offered ideas for new alternatives or alternative elements. Such comments are identified in “Chapter 2: The Alternatives.” Reasons for opposing the proposed project include cost and border security.

AGENCY CONSULTATION

In accordance with Section 5.5 of *Director’s Order 12* (NPS 2001), coordination and public involvement in the planning and preliminary design of the proposed action was initiated early in the decision-making process. As required by NPS policies and planning documents, it is the park objective to work with state, federal, and local governments and private organizations to ensure the park and its programs are coordinated with theirs, are supportive of their objectives, and that their programs are similarly supportive of park programs. The following agencies were consulted when preparing this EA.

FEDERAL DEPARTMENTS AND AGENCIES

- U.S. Department of Homeland Security
- U.S. Fish and Wildlife Service

RECIPIENTS OF THE ENVIRONMENTAL ASSESSMENT

To inform the public of the availability of the EA, the NPS will distribute a notification letter to local businesses and land owners; federal, state, and county agencies; affiliated tribes; representatives of educational institutions; nongovernmental organizations; and members of the public on the project mailing and e-mail lists. The EA will also be available electronically on the NPS PEPC website at <http://www.parkplanning.nps.gov/bibe>. Copies of the document will also be provided upon request. The following provides an overview of the types of agencies receiving the notification letter.

FEDERAL AGENCIES

- International Boundary and Water Commission
- U.S. Department of Agriculture
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service

TEXAS STATE AGENCIES

- Texas Congressional Delegation
- Texas Department of Health
- Texas Parks and Wildlife Department
- Texas Water Commission.
- State Historic Preservation Office, Texas Historical Commission

CONSULTED NATIVE AMERICAN GROUPS

- Apache Business Committee
- Blackfeet Tribal Business Council
- Comanche Tribal Business Committee
- Kickapoo Tribal Government
- Kiowa Business Committee
- Mescalero Apache Tribal Council
- Ysleta Tribal Government

LIST OF PREPARERS

National Park Service

William Wellman	Superintendent, Big Bend National Park
Philip Wilson	Chief of Resources, Big Bend National Park
David Elkowitz	Chief of Interpretation, Big Bend National Park
Lisa Turecek	Chief, Facility Management, Big Bend National Park
Thomas Alex	Archeologist, Big Bend National Park
Raymond Skiles	Wildlife Biologist and Wilderness Coordinator, Big Bend National Park
Jeffrey Bennett	Physical Scientist, Big Bend National Park
Donald Corrick	Geologist, Big Bend National Park
Laurie Domler	NEPA Specialist, Intermountain Regional Office

The Louis Berger Group, Inc.

Jacklyn Bryant	Project Manager
Dara Braitman	Planner
Lia Peckman	Environmental Scientist
David Plakorus	Planner

REFERENCES

Alex, Thomas C.

- 2010 Big Bend National Park and Vicinity. Arcadia Publishing. Charleston SC, Chicago IL, Portsmouth NH, San Francisco CA.
- 2011 Personal communication via telephone and email between Thomas Alex, Archeologist, Big Bend National Park, and Lucy Bambrey, The Louis Berger Group, Inc., re: cultural resources. March 3, 2011.

Association of State Floodplain Managers

- 2008 Natural and Beneficial Floodplain Functions: Floodplain Management – More than Flood Loss Reduction. Available online at:
http://www.floods.org/PDF/WhitePaper/ASFPM_NBF%20White_Paper_%200908.pdf. Accessed 1 April 2011.

Bibles, B.D., R.L. Glinski, and R.R. Johnson

- 2002 Gray Hawk (*Asturina nitida*). The Birds of North American Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. Available online at:
<http://bna.birds.cornell.edu/bna/species/652/articles/introduction>. Accessed 8 March 2011.

Campbell, Linda

- 2003 Endangered and Threatened Animals of Texas. Wildlife Division, Texas Parks and Wildlife. Available online at:
<http://www.tpwd.state.tx.us/huntwild/wild/species/endang/index.phtml>. Accessed 9 February 2011.

Cornell Lab of Ornithology

- n.d. All About Birds. Bird Guide (Online). Cornell University. Available online at:
<http://www.allaboutbirds.org/guide/search>. Accessed 10 February 2011.

Council on Environmental Quality (CEQ)

- 1978 “Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act.” *Code of Federal Regulations*, Title 40, Parts 1500-1508.
- 1980 “Analysis of Impacts on Prime and Unique Agricultural Lands in Implementing NEPA.” *Federal Register* 45: 59189.
- 1997 *Environmental Justice Guidance under the National Environmental Policy Act*. Washington, D.C.: Executive Office of the President. Available online at
<http://ceq.hss.doe.gov/nepa/regs/ej/ej.pdf>. Accessed 3 May 2011.

de Narvaez, Cynta

- 2011 Personal communication via email between Cynta de Narvaez and Dara Braitman, The Louis Berger Group, Inc., re: Fronteras Unlimited. February 16, 2011.

Dixon, J.R. and J.E. Werler

- 2005 Texas Snakes: A Field Guide. University of Texas Press, Austin, Texas, USA.

Edwards Aquifer Recovery Implementation Program (EARIP)

- 2010 Summary of mussel species to be considered by Covered Species Work Group (Draft 3 Nov 2010). Available online at: <http://earip.org/EARIPMeetings/Dec0910/12-09-10%20Attachment%203%20Mussels.pdf>. Accessed 8 March 2011.

Elkowitz, David

- 2011 Personal communication via email between David Elkowitz Chief of Interpretation, Big Bend National Park and Dara Braitman, The Louis Berger Group, Inc., re: economic impacts from visitor and Boquillas resident spending. March 16, 2011.

Embassy of the United States

- 2011 The Merida Initiative: Expanding the U.S.-Mexico Partnership. Available online at: <http://www.uspolicy.be/headline/merida-initiative-expanding-us-mexico-partnership>. Accessed 8 April 2011.

Environmental Systems Research Institute

- 2009 Census 2000 TIGER/Line Data. Available online at: <http://www.esri.com/data/download/census2000-tigerline/index.html>. Accessed 4 February 2011.

Etheridge, Allen S.

- 2011 Personal communication via email between Allen Etheridge, Chief Ranger, Big Bend National Park, and Laurie Domler, NEPA Specialist, NPS Intermountain Region – Denver, re: public health and safety, March 1, 2011.

Halpern, Alberto Tomas

- 2011 “Feds to reopen Boquillas border crossing”. Big Bend Sentinel, Volume 77, Number 39. January 13, 2011.

Executive Office of the President of the United States.

- 2009 Historical Tables, Fiscal Year 2009. Table 10.1 – Gross Domestic Product and Deflators Used in the Historical Tables: 1940-2013. Available online at: <http://www.whitehouse.gov/sites/default/files/omb/budget/fy2009/pdf/hist.pdf>. Accessed 10 January 2011.

Maxwell, Ross A.

- 1985 Big Bend Country: A History of Big Bend National Park, 1985, Big Bend Natural History Association.

MacLeod, William

- 2008 Big Bend Vistas, Journeys through Big Bend National Park. Texas Geological Press, Alpine, Texas. 2008.

Museum of Texas Tech University

- n.d. White-Nosed Coati. The Mammals of Texas – Online Edition. Available online at: <http://www.nsr1.ttu.edu/tmot1/nasunari.htm>. Accessed 8 March 2011.

National Park Service, U.S. Department of the Interior

- n.d. “*Hot Springs / Geothermal Areas*” Big Bend National Park. Available online at <http://www.nps.gov/bibe/naturescience/hotsprings.htm>. Last updated 21 January 2010. Accessed 27 April 2011.
- 1984 *Final Environmental Impact Statement, Proposed Wilderness Classification, Big Bend National Park, Texas*
- 1997 Recreational River Use Management Plan. March 1997.
- 1998a *NPS-28: Cultural Resource Management Guideline*. [Washington, D.C.].
- 1998b *Director’s Order 28A: Archeology*. [Washington, D.C.].
- 1998c *Director’s Order #2: Park Planning*. [Washington, D.C.].
- 1999 Big Bend National Park Cultural Landscape Inventory. On file at park.
- 2001 *Director’s Order #12 and Handbook: Conservation Planning, Environmental Impact Analysis, and Decision Making*. [Washington, D.C.].
- 2002 *Director’s Order #77-1: Wetland Protection* and procedural manual [Washington, D.C.].
- 2003 *Director’s Order #77-2: Floodplain Management*. [Washington, D.C.]
- 2004a Big Bend. Official Park Brochure. Big Bend National Park, Texas. Available online at: http://www.nps.gov/bibe/parknews/upload/BIBE_map-n-guide-text.pdf. Accessed 3 May 2011.
- 2004b *Director’s Order 47: Soundscape Preservation and Noise Management*. [Washington, D.C.]
- 2004c Big Bend National Park and Rio Grande Wild & Scenic River, Long-Range Interpretive Plan component of the Comprehensive Interpretive Plan. October 2004.
- 2004d Rio Grande Wild and Scenic River General Management Plan. October 2004.
- 2004e Final General Management Plan / Environmental Impact Statement, Big Bend National Park. Big Bend National Park, Texas. National Park Service.
- 2004f “*A Brief History of Water in the Big Bend*” Big Bend National Park. Available at <http://www.nps.gov/bibe/naturescience/historyofwater.htm>. Last updated 21 January 2010. Accessed 27 April 2011.
- 2005 Wildland Fire Management Big Bend National Park, Brewster County, Texas. June 2005.
- 2006a *Management Policies 2006*. [Washington, D.C.]

- 2006b “Develop New Drinking Water System – Rio Grande Village Environmental Assessment / Assessment of Effect” Big Bend National Park. September 2006.
- 2008a Big Bend 2008 Fact Sheet. Big Bend National Park, Rio Grande Wild & Scenic River. Available online at: <http://www.nps.gov/bibe/parknews/upload/BIBE-facts-2008.pdf>. Accessed 3 May 2011.
- 2009a Big Bend National Park – Mountain Lions in Big Bend. Available online at: <http://www.nps.gov/bibe/naturescience/mt-lions.htm>. Last updated 8 September 2009. Accessed 10 February 2011.
- 2009b Big Bend National Park – A Cultural History of the Big Bend. Available online at: http://www.nps.gov/bibe/historyculture/cultural-history_overview.htm. Last updated 30 July 2009. Accessed 21 March 2011.
- 2009c Construct New Housing and Operations Facilities Environmental Assessment, Finding of No Significant Impact. 2009.
- 2010a Archaeology & Big Bend. Available online at: <http://www.nps.gov/bibe/historyculture/archaeology.htm>. Last updated 20 June 2009. Accessed 14 January 2011.
- 2010b Big Bend National Park, Annual Visitation, 1944-2007, Visitation Statistics, National Park Service.
- 2010c NPS Stats. National Park Service Public Use Statistics Office.
- 2010d Big Bend Paisano. Volume 31, number 1. Winter/Spring 2010/2011. Big Bend National Park. National Park Service.
- 2010e 2009 Fact Sheet. Big Bend National Park.
- 2010f Big Bend National Park – Nature & Science. Available online at: <http://www.nps.gov/bibe/naturescience/index.htm>. Last updated 9 November 2010. Accessed 26 January 2011.
- 2010g Big Bend National Park – Mammals. Available online at: <http://www.nps.gov/bibe/naturescience/mammals.htm>. Last updated 30 January 2010. Accessed 10 February 2011.
- 2010h Big Bend National Park – Black Bear Habitat. Available online at: <http://www.nps.gov/bibe/naturescience/bearhabitat.htm>. Last updated 21 January 2010. Accessed 26 January 2011.
- 2010i Big Bend National Park – The Collared Peccary, or Javelina. Available online at: <http://www.nps.gov/bibe/naturescience/javelina.htm>. Last updated 21 January 2010. Accessed 10 February 2011.
- 2010j Big Bend National Park – “Interview with a Bat.” Available online at: http://www.nps.gov/bibe/naturescience/interview_bat.htm. Last updated 21 January 2010. Accessed 10 February 2011.

- 2010k Big Bend National Park – Birds. Available online at:
<http://www.nps.gov/bibe/naturescience/birds.htm>. Last updated 14 September 2010.
Accessed 11 February 2011.
- 2010l Big Bend National Park – Reptiles. Available online at:
<http://www.nps.gov/bibe/naturescience/reptiles.htm>. Last updated 30 January 2010.
Accessed 26 January 2011.
- 2010m Big Bend National Park – Turtles in Big Bend. Available online at:
<http://www.nps.gov/bibe/naturescience/turtles.htm>. Last updated 30 January 2010.
Accessed 26 January 2011.
- 2010n Big Bend National Park – Leapin Lizards. Available online at:
<http://www.nps.gov/bibe/naturescience/lizards.htm>. Last updated 30 January 2010.
Accessed 26 January 2011.
- 2010o Big Bend National Park – Snakes of Big Bend. Available online at:
<http://www.nps.gov/bibe/naturescience/snakes.htm>. Last updated 30 January 2010.
Accessed 26 January 2011.
- 2010p Big Bend National Park – Fish. Available online at:
<http://www.nps.gov/bibe/naturescience/fish.htm>. Last updated 30 January 2010. Accessed 7
February 2011.
- 2010q Exotic Animal Management Plans and EAs (2011, in progress), Big Bend National Park,
Science and Resource Management Division.
- 2010r Big Bend National Park Air Quality. Available online at
<http://www.nps.gov/bibe/naturescience/airquality.htm>. Last updated January 21, 2010.
Accessed 7 April 2011.
- 2010s Partners in Protection: U.S.-Mexico Cooperation in the Big Bend-Rio Bravo Region.
- 2011a Photos of Big Bend National Park. Provided by or taken for the park.
- 2011b Value Added Report for Design Alternatives of Visitor Contact Station.
- 2011c Project Management Information System report. Information sheet for Boquillas Crossing.

NatureServe

- 2010 NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1.
NatureServe, Arlington, Virginia. Available online at <http://www.natureserve.org/explorer/>.
Accessed 8 February 2011.

New Mexico Department of Game and Fish (NMDGF)

- n.d. Texas Hornshell Mussel. Wildlife Notes. Available online at:
http://www.wildlife.state.nm.us/education/wildlife_notes/documents/NoteTXhornSm.pdf.
Accessed 7 March 2011.

Schnell, J.H.

- 1994 Common Black-Hawk (*Buteogallus anthracinus*). The Birds of North America Online (A. Poole, Ed.) Ithaca: Cornell Lab of Ornithology. Available online at: <http://bna.birds.cornell.edu/bna/species/122/articles/introduction>. Accessed 8 March 2011.

Skiles, Raymond

- 2011 Personal communication via email between Raymond Skiles, Wildlife Biologist, Big Bend National Park and Lia Peckman, The Louis Berger Group, Inc., re: federally and state-listed species associated with Boquillas Crossing. March 4, 2011.
- 2011 Personal communication via email between Raymond Skiles, Wildlife Biologist, Big Bend National Park, and Dara Braitman, The Louis Berger Group, Inc., re: new road in Mexico. March 22, 2011.

Stynes, Daniel J.

- 2009 Department of Community, Agriculture, Recreation, and Resources Studies, Michigan State University. National Park Visitor Spending and Payroll Impacts 2008. Available online at: <http://web4.msue.msu.edu/mgm2/parks/MGM2System2008.pdf>. Accessed 10 January 2011.

Sullivan, J.

- 1996 *Urocyon cinereoargenteus*. In Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research State, Fire Sciences Laboratory (Producer). Available online at: <http://www.fs.fed.us/database/feis/animals/mammal/urci/introductory.html>. Accessed 3 February 2011.

Texas Parks and Wildlife Department (TPWD)

- 2008 Texas Mussel Watch. Available online at: http://www.tpwd.state.tx.us/learning/texas_nature_trackers/mussel/. Last modified 29 September 2008. Accessed 7 March 2011.
- 2009 Wildlife Fact Sheets. Available online at: <http://www.tpwd.state.tx.us/huntwild/wild/species/>. Last modified 2 June 2009. Accessed 8 February 2011.

U.S. Army Corps of Engineers

- 2003 Effects of Riprap on Riverine and Riparian Ecosystems. Available online at: <http://el.erdc.usace.army.mil/wrap/pdf/trel03-4.pdf>. Accessed 14 February 2011.

U.S. Department of Agriculture (USDA)

- 1985 National Resource Conservation Service. 1985. *Soil Survey of Big Bend National Park, Texas*.

U.S. Census Bureau

- 2010 Population Estimates. Incorporated Places and Minor Civil Divisions. All Places: 2000 to 2009. Table 4. Annual Estimates of the Residential Population for Incorporated Places in Texas: April 1, 2000 to July 1, 2009. Available online at: <http://www.census.gov/popest/cities/SUB-EST2009-4.html>. Accessed 3 February 2011.

U.S. Department of Commerce, Bureau of Economic Analysis

- 2010a Texas Historical Population Growth 1970-2008, Table CA1-3. Available online at: <http://www.bea.gov>. Accessed 10 January 2011.
- 2010b Per Capita Income, Table CA1-3. Available online at: <http://www.bea.gov>. Accessed 10 January 2011.
- 2010c Total Employment by Industry, Table CA25. Available online at: <http://www.bea.gov>. Accessed 10 January 2011.

U.S. Department of Labor, Bureau of Labor Statistics

- 2010 Unemployment Rates. Available online at: <http://www.bls.gov>. Accessed 10 January 2011.

U.S. Environmental Protection Agency (USEPA)

- 1998 *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses*. Available online at: http://www.epa.gov/compliance/ej/resources/policy/ej_guidance_nepa_epa0498.pdf. Accessed 3 May 2011.

U.S. Fish and Wildlife Service (USFWS)

- 1984 Big Bend Gambusia Recovery Plan. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.
- 2010a Rio Grande Silvery Minnow Recovery Plan. First Revision. Southwest Region, Albuquerque, New Mexico. 15 January 2010.
- 2010b Species Assessment and Listing Priority Assignment Form – *Coccyzus americanus*. 28 April 2010.
- 2010c Species Assessment and Listing Priority Assignment Form – *Popenaias popeii*. April 2010.

U.S. Geological Survey (USGS)

- 2006a Mammal Checklist of the United States, Big Bend National Park. Northern Prairie Wildlife Research Center, U.S. Geological Survey, U.S. Department of the Interior. Available online at: <http://www.npwrc.usgs.gov/resource/birds/chekbird/r2/bbend.htm>. Last modified 2 August 2006. Accessed 24 January 2011.
- 2006b Bird Checklists of the United States, Big Bend National Park. Northern Prairie Wildlife Research Center, U.S. Geological Survey, U.S. Department of the Interior. Available online at: <http://www.npwrc.usgs.gov/resource/birds/chekbird/r2/bbend.htm>. Last modified 3 August 2006. Accessed 24 January 2011.

- 2006c Amphibian and Reptile Checklists of the United States, Big Bend National Park. Northern Prairie Wildlife Research Center, U.S. Geological Survey, U.S. Department of the Interior. Available online at: <http://www.npwrc.usgs.gov/resource/birds/chekbird/r2/bendrep.htm>. Last modified 3 August 2006. Accessed 24 January 2011.

Wauer, R.H. and C.M. Fleming

- 2002 *Naturalist's Big Bend: An Introduction to the Trees and Shrubs, Wildflowers, Cacti, Mammals, Birds, Reptiles and Amphibians, Fish, and Insects*. College Station, TX: Texas A&M University Press.

APPENDIX A: IMPAIRMENT DETERMINATION

THE PROHIBITION ON IMPAIRMENT OF PARK RESOURCES AND VALUES

Section 1.4.4 of NPS *Management Policies 2006*, explains the prohibition on impairment of park resources and values.

While Congress has given the Service the management discretion to allow impacts within parks, that discretion is limited by the statutory requirement (generally enforceable by the federal courts) that the Park Service must leave park resources and values unimpaired unless a particular law directly and specifically provides otherwise. This, the cornerstone of the Organic Act, establishes the primary responsibility of the National Park Service. It ensures that park resources and values will continue to exist in a condition that will allow the American people to have present and future opportunities for enjoyment of them.

WHAT IS IMPAIRMENT?

Sections 1.4.5 and 1.4.6 of *Management Policies 2006* provide an explanation of impairment.

...impairment...is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values.

Specifically, Section 1.4.5 of *Management Policies 2006* states:

An impact to any park resource or value may, but does not necessarily, constitute impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park; or
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- Identified in the park's general management plan or other relevant NPS planning documents as being of significance.

An impact would be less likely to constitute an impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values and it cannot be further mitigated.

Section 1.4.6 of *Management Policies 2006* identifies park resources and values that may be impaired.

The park's scenery, natural and historic objects, and wildlife, and the processes and conditions that sustain them, including, to the extent present in the park; the ecological, biological, and physical processes that created the park and continue to act upon it; scenic features; natural visibility, both in daytime and at night; natural landscapes; natural soundscapes and smells; water and air resources; soils; geological resources; paleontological resources; archeological resources; cultural landscapes; ethnographic resources; historic and prehistoric sites, structure, and objects; museum collections; and native plants and animals.

NPS actions should support:

- Appropriate opportunities to experience enjoyment of the above resources, to the extent that can be done without impairing them;
- The park’s role in contributing to the national dignity, the high public value and integrity, and the superlative environmental quality of the national park system, and the benefit and inspiration provided to the American people by the national park system; and
- Any additional attributes encompassed by the specific values and purposes for which the park was established.

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park. Impairment may also result from sources or activities outside the park, but this would not be a violation of the Organic Act unless the NPS was in some way responsible for the action.

HOW IS AN IMPAIRMENT DETERMINATION MADE?

Section 1.4.7 of *Management Policies 2006* identifies how an impairment determination is made.

In making a determination of whether there would be an impairment, an NPS decision-maker must use his or her professional judgment. This means that the decision-maker must consider any environmental assessments or environmental impact statements required by the National Environmental Policy Act of 1969 (NEPA); consultations required under Section 106 of the National Historic Preservation Act (NHPA), relevant scientific and scholarly studies; advice or insights offered by subject matter experts and others who have relevant knowledge or experience; and the results of civic engagement and public involvement activities relating to the decision.

Management Policies 2006 further defines “professional judgment” as “a decision or opinion that is shaped by study and analysis and full consideration of all the relevant facts, and that takes into account the decision-makers education, training, and experience; advice or insights offered by subject matter experts and others who have relevant knowledge and experience; good science and scholarship; and, whenever appropriate, the results of civic engagement and public involvement activities relating to the decision.”

IMPAIRMENT DETERMINATION FOR THE PREFERRED ALTERNATIVE

This determination on impairment has been prepared for alternative B described in “Chapter 2: The Alternatives” of this environmental assessment (EA). An impairment determination is made for all resource impact topics analyzed for alternative B. An impairment determination is not made for visitor use and experience, socioeconomics, park operations and management, and public health and safety since impairment findings relate back to park resources and values. These impact areas are not generally considered to be park resources or values according to the NPS *Organic Act of 1916* and cannot be impaired in the same way that an action can impair park resources and values.

The NPS has determined that the implementation of the NPS alternative B would not constitute an impairment to the resources or values in Big Bend National Park. This conclusion is based on consideration of the thorough analysis of the environmental impacts described in the EA, relevant scientific studies, comments provided by the public and others, and the professional judgment of the decision-maker guided by direction in *Management Policies 2006*. Implementation of the NPS selected

alternative would not result in impairment of park resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified in the park's management plan or other relevant NPS planning documents as being of significance.

FINDINGS ON IMPAIRMENT FOR THE CONSTRUCTION AND OPERATION OF A VISITOR CONTACT STATION IN BIG BEND NATIONAL PARK

Alternative B would result in short-term to long-term negligible to minor adverse impacts on some of the park's resources, which include water resources; floodplains; wild and scenic rivers; water resources; soils and vegetation; and wildlife and wildlife habitat, including threatened and endangered species. The following provides an overview of impairment determinations for each resource topic evaluated in the EA.

WILD AND SCENIC RIVERS

In 1978, Congress designated a segment of the Rio Grande a national wild and scenic river under the *Wild and Scenic Rivers Act* (WSRA). The designated section of the Rio Grande begins in the park, opposite the boundary between the Mexican states of Chihuahua and Coahuila. It then continues through Mariscal and Boquillas canyons and ends at the county line between Terrell and Val Verde counties, Texas. The designated portion of the river within the park is 69 miles. The section from Solis to the entrance of Boquillas Canyon, which includes the proposed project area, is classified as scenic. Under the scenic classification, desired conditions and processes are mostly natural. Natural and historic landscapes are maintained as much as possible, and all values considered outstandingly remarkable are protected. This type of classification allows for moderate carrying capacity of visitors for locations accessible in some places by roads and in other places by trails. While there are visitor use restrictions and restrictions on development, certain land-use developments are acceptable.

During construction activities associated with the proposed project, construction equipment would be present and possibly visible from the river. Therefore, scenic values in this portion of the project area would experience short-term negligible to minor adverse impacts.

The proposed visitor contact station would be designed to be architecturally compatible to the nearby Barker House, located just east from the project area. A pre-fabricated chlorine booster station would also be installed near the Berkley Cottage. The proposed visitor contact station would include solar photovoltaic panels and rainwater catchment areas. These features may be visible from the river, whereas generally views of the contact station and chlorine booster station from the river would be obstructed by landscapes and existing and planted vegetation. Because of this obstruction, the visitor contact station and chlorine booster station would have long-term, negligible adverse impacts on scenic resources. Under the action alternative, visitors would access the proposed project site via the existing closed road. Depending on one's location on the river, vehicles entering the proposed visitor contact station may be visible. The increase in vehicle traffic associated with the proposed project would result in long-term negligible to minor adverse impacts to scenic values, depending on the number of automobiles.

Due to the subjective nature of scenic values combined with the fact that the crossing would be reverted to its historical use, the increased cultural appeal of the area would result in long-term beneficial impacts to the river's scenic values.

Implementation of the preferred alternative would not appreciably change the outstandingly remarkable scenic values associated with this reach of the Rio Grande Wild and Scenic River. Although new visitor contact station could occasionally be visible from the river corridor through riparian vegetation, it is not

anticipated that the majority of visitors would be aware of changes in scenic values. Because the values for which the Rio Grande was designated a Wild and Scenic River would not be measurably affected, alternative B would not result in impairment to wild and scenic river values.

WATER RESOURCES

The project area is located in the eastern part of the park, on the north side of the Rio Grande meander. The Rio Grande is the only perennial stream in the area. The Deep Fault Well, located approximately ½ mile northwest of the proposed project area, currently represents the only existing source of potable drinking water for the area. The well consists of water accumulated from a number of springs and aquifers in the nearby area.

The estimated increase of between 18,000 and 25,000 visitors annually to the Boquillas area as a result of the proposed project would place additional demand on the existing water supply. Such a change in demand would be attributable to restrooms and drinking fountains implemented as part of the proposed project. With implementation of water conservation methods across the southern part of the park as identified by park staff, including the installation of a rain water collection system for toilets and irrigation use, low-flow toilets and other fixtures, the increased demand from implementation of the proposed project would not exceed historic rates resulting in no measurable effect. Additionally, water required for use in the septic tank, pump station and drainfield would not place demand on water resources that would exceed historic rates and would not contribute to water quality resulting in no measureable effect.

The use of a chlorine booster station would work to improve low chlorine residual concentrations of water near Berkley Cottage to levels of 0.2 mg/liter as mandated by the Groundwater Rule administered by the Texas Commission of Environmental Quality, resulting in long-term beneficial impacts to water quality.

Because water conservation measures have been implemented to protect the groundwater resources of the Deep Fault Well, the preferred alternative would not appreciably change water demand in this part of the park. The park's commitment to provide visitor services within historic water use rates would remain in place. Because there would be no measurable changes in groundwater use, implementation of alternative B would not reduce groundwater levels, or contribute to a reduction in water quality and would continue sustainable use of this valuable resource. Therefore, alternative B would not result in impairment to water resources.

FLOODPLAINS

The Federal Emergency Management Agency (FEMA) produces a Flood Insurance Rate Map (FIRM) identifying special hazard areas and risk premium zones applicable to the community. A review of the FIRM applicable to the proposed project area (community-panel number 480084 1500 B, revised on October 15, 1985) and conversations with park staff indicates the existing trail, which would be rehabilitated as part of the proposed project, is located inside the 100-year floodplain, whereas part or all of the proposed visitor contact station likely falls outside the 100-year floodplain. Newer FEMA maps are not available for the area and the site flood hazard remains undetermined.

The most significant flood in recent years occurred in 2008 because of tropical depression Lowell, which dropped extreme amounts of precipitation in the Mexican state of Chihuahua, southwest of the park. During this period, a large amount of rainwater flowed into the Rio Conchos watershed (the primary source of water in the Rio Grande as it flows through the park), resulting in the deepest flood in the recorded history of the park. Flows on the river normally 2 to 3 feet deep grew to over 30 feet deep in places. Although damage within the park and nearby areas outside the park was extensive, areas within

the immediate vicinity of the proposed project experienced only a slight increase in water levels and negligible to no damage. The site of the proposed visitor contact station was not inundated during this event. The previous flood of significant size occurred in 1991.

The construction of the visitor contact station and associated utilities including propane tanks and chlorine booster station could inhibit, somewhat, the ability of the site to disperse flood flows and energy, and floodplains functions of is the site would be altered. The use of silt fencing protects the project area from soil erosion and sediment control, which when combined with the relatively small size of the proposed visitor contact station and associated aspects and its proposed location on the edge of the 100-year floodplain, and anticipated rare occurrence of flows reaching the site, the result of construction would be long-term negligible and adverse. At the boundary of the 100-year floodplain, flow volumes and speeds would be low, and there would be limited potential for the structure to exacerbate upstream or downstream ponding or other flood characteristics.

Because effects to floodplain function would be limited by 1) the small size of the visitor contact station, 2) its proposed location at the edge of the 100-year floodplain, and 3) the rare occurrence of flood flows capable of reaching the project area, impacts would be localized and negligible. The floodplain in the vicinity would continue to function to disperse flood flows and energy as it has in the past. Because potential impacts would be minimal, alternative B would not result in impairment to floodplain functions or values.

SOILS

Floodplain soils along the bank of the Rio Grande are loamy, which indicates they consist of finer grains of silt, clay, and sand, as well as coarser elements such as gravel reminiscent of soils typically found on a floodplain. Moving west and to higher elevations, where the visitor contact station is proposed the soils are shallower and composed of coarser materials, such as gravel. Much of the area proposed for construction is located at and adjacent to the existing parking area which was filled to support prior uses.

The proposed project would require the disturbance of an area approximately 20,000 sq. ft. during construction activities; however, the majority of soils that would be affected by the proposed project have been previously disturbed. During construction activities, the soil layer structure would be disturbed and modified and soils would be exposed, increasing the overall potential for erosion. Resource protection measures would include the employment of BMPs, including the use of silt fencing to prevent and control soil erosion and sedimentation during construction of the proposed project. Soils disturbed within the proposed construction area would be actively reseeded to stabilize the soil, repair compaction, and/or improve soil productivity. Short-term minor adverse effects to soils would result during the construction of the proposed project.

Impacts would be limited in areas of the proposed location of the visitor contact station, parking lot, existing trail, proposed overlook and the majority of the area for utility trenching. In these areas, soils have been previously disturbed and filled with nonnative soils. Further disturbance to these areas would result in long-term negligible and adverse impacts. The use of asphalt for ADA accessible parking and associated access aisle would increase the amount of impervious surface. The small scale of asphalt usage and the allowance of water runoff to sheetflow offsite would result in no effect from the use of impervious surfaces.

The installation of a new septic system and leach field would require the use of class 1b soils suitable for use in a drainfield. These soils would be used as 2-foot thick buffers, placed below and on all sides of the drainfield, topped with one foot of native soil. This action permanently modifies the soil structure within the drainfield, but the site would retain the capability to support native vegetation and when combined

with possible biological or chemical alterations to soils from leaks and materials present results in site-specific long-term negligible adverse impacts.

The removal of the existing riprap in the river and the use of temporary portable walking surfaces would decrease the potential for erosion along the riverbank, also resulting in long-term beneficial impacts.

Because effects to soil resources would be concentrated in previously disturbed and filled areas, and disturbed soils would not lose their ability to support native vegetation in the future, long-term impacts to soils resource would be limited, alternative B would not result in impairment to the park's soils resources.

VEGETATION

Two vegetation types (floodplain/upland riparian and desert shrub) are present within the project area. However, because much of the proposed project area has previously been disturbed or filled, vegetation is sparse and, in certain locations, was absent for decades.

The construction of the proposed elements under alternative B would occur in previously disturbed areas with little to no vegetation. However, construction activities would require the removal of any vegetation found in the construction footprint. To limit disturbance to vegetation in the proposed project area and to manage soil erosion and sediment during construction activities, BMPs including silt fencing would be used. Vegetation removed within the proposed construction area would be replanted. Providing access to the Rio Grande includes reduction of the trail width from 12 feet to 6 feet, providing a limited benefit to adjacent vegetation. Impacts to vegetation from these components of the proposed action would be localized, short-term, and negligible.

The septic system drainfield and pump house would be located in previously undisturbed uplands just south of the visitor contact station. Installation of the 64-foot by 31-foot drainfield, pump station and septic tank would require the removal of existing vegetation and soils. Subsequent site rehabilitation would include use of native soils and vegetation. The operation of the leach field would support native vegetation on the site. The effects of the drainfield on vegetation would be localized, short-term, minor, and adverse.

Because much of the proposed project area is previously disturbed, there would be minimal impacts to existing vegetation. Vegetation and vegetative communities outside the proposed project area would not be affected by the proposed project. Habitats in the project area would continue to be dominated by native plants, and this would continue into the future. Because long-term changes in vegetation are not expected and short-term impacts are very limited, alternative B would not result in impairment of the park's vegetation resources.

WILDLIFE AND WILDLIFE HABITAT, INCLUDING THREATENED AND ENDANGERED SPECIES

WILDLIFE

Construction activities associated with the proposed project would result in short-term minor adverse impacts on wildlife and wildlife habitat from species displacement and habitat disturbance. The impacts of equipment staging and storage sites on wildlife and wildlife habitat would likely be short-term negligible to minor adverse.

The presence of the visitor contact station would result in long-term minor adverse impacts to wildlife and wildlife habitat from potential species displacement. Additionally, the increased presence of visitors in the area could disrupt wildlife, contributing to adverse impacts. Although the park is open 24 hours a day, the

proposed hours of operation of the visitor station would be primarily limited to daylight hours. Therefore, adverse impacts that could result from visitor presence would be reduced in the evening and early morning, when nocturnal species are most active.

Because of the shallow depth of the river, impacts to aquatic species and habitat from river crossing would likely be long-term minor adverse. Removal of the degraded riprap at the edge of the river would require the use of heavy machinery and would generate release sediment upon removal. Therefore, localized, short-term minor to moderate adverse impacts would result from disturbance of habitat and potential mortality of fish and aquatic invertebrates in the immediate vicinity. There is a possibility that a minor loss of minnow habitat would occur with removal of the riprap; however, the impacts would be short-term negligible adverse because widespread suitable habitat occurs throughout the area, and impacts would have no effect on populations. The long-term impacts of removing the riprap would be beneficial as a more natural river / bank integration would be restored, which benefits native aquatic species.

The proposed project would result in localized short-term negligible to minor adverse impacts on native wildlife and wildlife habitat during implementation of management actions. However, following construction activities, the presence of the contact visitor station would likely result in long-term minor adverse impacts from visitor presence and minor habitat fragmentation.

The project area (less than 20,000 sq. ft.) represents only a small fraction of the 800,000 acres of wildlife habitat found in Big Bend National Park. Although wildlife species would be disturbed – over the short and long-term – by implementation of alternative B, effects to habitats would be small and localized. Suitable habitats would continue to be available adjacent to the project area for both terrestrial and aquatic species. Therefore, implementation of the preferred alternative would not result in impairment of wildlife and wildlife habitat resources in the park.

FEDERALLY-LISTED SPECIES

The Deep Fault Well is the source of water for Spring 4 in Rio Grande Village, which provides habitat for the Big Bend mosquitofish. Although using Deep Fault Well as the water source for the visitor contact station could indirectly affect habitat for this species, the proposed potable water system combined with water protection measures to be implemented by the park are designed to ensure that water use does not exceed historic levels. Therefore, implementation of proposed project is *not likely to adversely affect* the Big Bend mosquitofish.

The Rio Grande silvery minnow requires low-velocity habitats with sandy and silty substrate generally associated with river side channels, oxbows, and backwaters (73 FR 74359). It is possible that silvery minnow habitat would be affected by the opening of the Boquillas crossing and the removal of riprap proposed under alternative B. Although the presence of this species is confirmed along this stretch of the Rio Grande, it is questionable whether this species inhabits the pools in the river created by the riprap. Effects associated with the removal of riprap and the opening of the Boquillas crossing on the silvery minnow would be difficult to detect or evaluate, and would be discountable. Additionally, sufficient habitat exists along the Rio Grande where this species would be able to relocate if necessary. Therefore, implementation of the proposed project is *not likely to adversely affect* the Rio Grande silvery minnow. The yellow-billed cuckoo is a confirmed nesting species in the park and is known to breed in riparian habitats with cottonwoods and willows. Although riparian habitat exists in the project area, dense understory foliage is not characteristic of the area, which appears to be an important factor in nest site selection for this bird. Because this species winters in South America, it is anticipated that the cuckoo would not experience adverse effects from construction activities which are scheduled to occur during this time. The implementation of the proposed project could result in habitat avoidance and disturbance of nesting and foraging activities for the yellow-billed cuckoo. However, suitable nesting habitat exists for

this species in widespread areas of the Rio Grande floodplain, including nearby Rio Grande Village. Therefore, implementation of alternative B is not expected to result in detectable impacts to the yellow-billed cuckoo, and impacts would be discountable, resulting in a *not likely to adversely affect* Section 7 finding for this species.

The Texas hornshell mussel normally lives in narrow areas of rivers and streams with travertine bedrock and fine-grained sand, clay or gravel on the bottom. Although the existing riprap provides potential habitat for the Texas hornshell, this species is considered sparse in the Rio Grande and populations have not been confirmed in the area. It is possible that injury or mortality to one or two individuals may occur during removal of the riprap; however, impacts at the population level would be discountable. Therefore, implementation of the proposed project is *not likely to adversely affect* the Texas hornshell mussel.

Wildlife disturbance and very limited habitat loss and avoidance are possible under the proposed project, and impacts to populations would be discountable. Implementation of the proposed project is not likely to adversely affect federally-listed species in the project area. Therefore, implementation of alternative B would not result in impairment of species listed under, or candidates for listing under the Endangered Species Act.

STATE-LISTED SPECIES

As described for wildlife and wildlife habitat, construction activities associated with the visitor contact station would result in localized, short-term negligible to minor adverse impacts on state-listed species from potential displacement and habitat disturbance. Short-term adverse impacts would likely be negligible for state-listed fish and invertebrate species as their habitat would not be affected by construction activities associated with the proposed project.

Grading of the access road and parking lot could result in temporary disturbance to the state-listed reticulated gecko and Trans-Pecos black-headed snake. Adverse impacts would likely be short-term and negligible due to the rarity of such species and previous disturbance of these areas. Similarly, because there would be no new land disturbance, construction of a walking trail to the top of the hill just south of the proposed visitor station would result in short-term negligible adverse impacts on state-listed wildlife species. Grading of the existing trail from the parking lot of the visitor contact station to the river would result in short-term negligible adverse impacts on state-listed species because of existing disturbance to the area. However, additional disturbance would occur from the trimming and removal of some vegetation to improve visibility of the trail from the river. Because the majority of vegetation would be retained, including mature trees along the access trail, adverse impacts to state-listed species would likely be short-term and minor.

The potential species displacement and habitat fragmentation from operation of the proposed project would result in long-term minor adverse impacts to state-listed birds, mammals, and reptiles associated with the area. Additionally, the increased presence of visitors in the area could disrupt sensitive birds hunting the river corridor, contributing to adverse impacts. Although the park is open 24 hours a day, the proposed hours of operation of the proposed project would be primarily limited to daylight hours. Therefore, adverse impacts that could result from visitor presence would be reduced in the evening and early morning, when the spotted bat, reticulated gecko, and Trans-Pecos black-headed snake are most active.

As described for wildlife and wildlife habitat, impacts to aquatic state-listed species from river crossing would likely be long-term minor adverse because of the shallow depth of the river at the crossing and its historic use. The use of temporary, mobile, walking surfaces when conditions are muddy would reduce the potential for erosion along the riverbank, resulting in long-term benefits to habitat along the river.

Removal of the degraded riprap at the edge of the river would result in localized, short-term minor to moderate adverse impacts from disturbance of habitat and potential mortality of fish and aquatic invertebrates in the immediate vicinity.

There is a possibility that a minor loss of minnow habitat would occur with removal of the riprap; however, the impacts would be short-term negligible adverse because widespread suitable habitat occurs throughout the area, and impacts would have no effect on populations. The long-term impacts of removing the riprap would be beneficial as a more natural river / bank integration would be restored, which benefits native aquatic species.

Wildlife disturbance and very limited habitat loss and avoidance are possible under the proposed project, and impacts to state-listed species would also be limited. Implementation of the proposed project would not affect local population levels or result in long-term disturbance of large areas of habitat. Therefore, implementation of alternative B would not result in impairment of state-listed special status species.

APPENDIX B: STATEMENT OF FINDINGS
FOR
EXECUTIVE ORDER 11988 (FLOODPLAIN MANAGEMENT)
Boquillas Crossing Visitor Contact Station
Big Bend National Park

Recommended:

_____	_____
Superintendent, William Wellman Big Bend National Park	Date

Certification of Technical
Adequacy and Servicewide
Consistency:

_____	_____
Chief Water Resources Division	Date

Approved:

_____	_____
Director Intermountain Region Office	Date

FLOODPLAIN STATEMENT OF FINDINGS

Big Bend National Park (the park) is preparing an environmental assessment for the proposed construction and operation of a visitor contact station and establishment a Class B port of entry (POE) at the Boquillas crossing and the Rio Grande between the United States and Mexico within the park.

Executive Order 11988: *Floodplain Management*, enacted by president Jimmy Carter in 1977, requires the National Park Service (NPS) and other federal agencies to avoid to the extent possible the short- and long-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. Under the Executive Order, each agency shall provide leadership and shall take action to reduce the risk of flood loss; to minimize the impact of floods on human safety, health, and welfare; and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities. Each agency is responsible for the following:

1. Acquiring, managing, and disposing of federal lands and facilities
2. Providing federally undertaken, financed, or assisted construction and improvements
3. Conducting federal activities and programs affecting land use, including but not limited to water and related land use resources, planning, regulating, and licensing activities (Executive Order 11988).

NPS *Director's Order 77-2, Floodplain Management and Procedural Manual 77-2* (NPS 2003) provide NPS policies and procedures for complying with Executive Order 11988. A Statement of Findings is required because a portion of the proposed project area would potentially be located within the 100-year floodplain. The following Statement of Findings identifies elements of the proposed project located within the 100-year floodplain and mitigation measures designed for the proposed project to comply with NPS floodplain management procedures.

PROPOSED ACTION

Alternative B, the preferred alternative, includes the construction and operation of a visitor contact station and Class B POE at Boquillas crossing and the Rio Grande between the United States and Mexico within the park. Construction activities associated with the preferred alternative would require the disturbance of an area approximately 20,000 square feet (sq. ft.) or slightly less than 1/2 acre. This disturbance includes all components of the preferred alternative including the visitor contact station, parking lot, access road, trail, and utility trenching footprints, in addition to those areas that would only be used during construction staging. The proposed visitor contact station would require an area of approximately 1,620 sq. ft. and would include solar photovoltaic panels and rainwater catchment areas.

The proposed project would provide visitor services such as park information, maps, interpretive and educational information, restrooms, drinking fountains, and a steam sterilizer for fruits and vegetables surrendered upon entry to the United States. The proposed visitor contact station would also include a safe room for equipment necessary to operate the POE and two automated entry stations (kiosks). Persons entering the United States via the Boquillas crossing would be required to show proper documentation for verification at the kiosks before entering the park. Customs and Border Patrol (a division of Department of Homeland Security) staff would interact remotely with those entering the United States to ensure proper documentation. Because the site would be a remote, automated POE, no Customs and Border Patrol personnel would be located in the visitor contact station. However, NPS staff at the site could

provide information on international crossing legal requirements, how to use the remote POE, logistics associated with the boat vendors, and activities/sites available within the Mexican protected areas and the village of Boquillas, Mexico. No options for camping or overnight habitation of the site are included in the proposed action.

To support the proposed visitor contact station, existing utilities would be expanded and new utilities would be introduced to appropriately serve project objectives. This includes the installation a chlorine booster station to maintaining a free-chlorine residual level and a septic system which includes a septic tank, drainfield, and pump house.

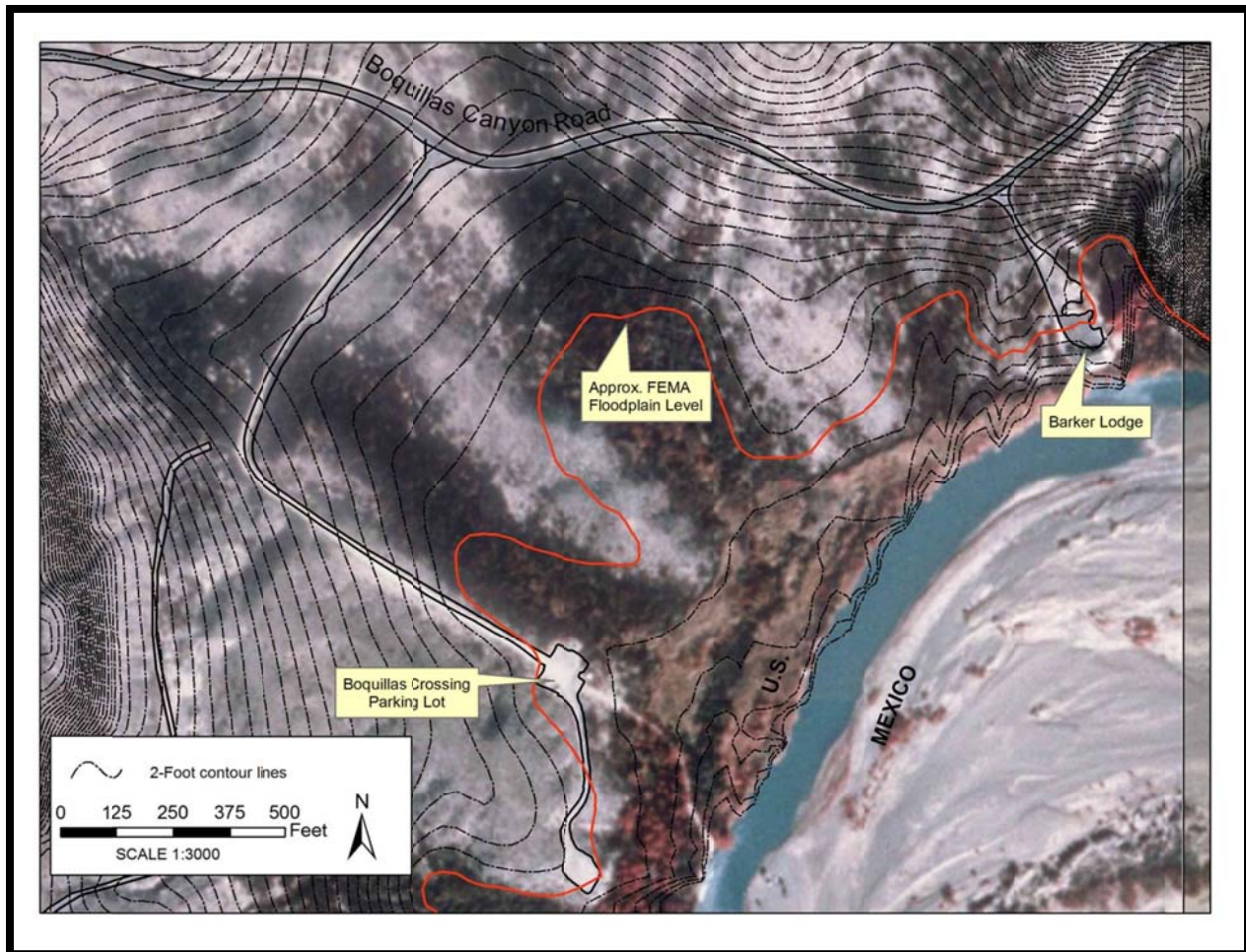
Access to the river crossing would be via the existing trail from the parking area to the river. Grading and adding a layer of gravel would stabilize the trail. The width of the trail would decrease from approximately 12 feet to approximately 6 feet. Trimming of trees and clearing giant reeds would improve visibility of the trail from the river. However, most vegetation would be retained to provide shade cover, as would mature trees that form a shade canopy along the access trail.

At the base of the trail, a shade structure made of cedar and topped with cane (dried giant reeds) would be installed to provide a respite from the summer sun. This type of shade canopy would be consistent with the historic ambience of the site, but would not be designed to withstand flooding and would be replaced if it were removed by high flows.

Temporary, mobile, walking surfaces (e.g., Mister Boardwalk[®]) would be used along the river to provide sound footing for those visiting or crossing the riverbank when conditions are muddy. The use of such walking surfaces would also reduce the potential for erosion along the riverbank. At the edge of river, the degraded riprap associated with the ferry landing used when the border was open would be removed.

SITE DESCRIPTION

The Federal Emergency Management Agency (FEMA) produces a Flood Insurance Rate Map identifying special hazard areas and risk premium zones applicable to the community. A review of the Flood Insurance Rate Map (FIRM) applicable to the proposed project area (community-panel number 480084 1500 B, revised on October 15, 1985) and conversations with park staff indicate the existing trail, which would be rehabilitated as part of the proposed project, is located inside the 100-year floodplain while part or all of the proposed visitor contact station likely falls outside the 100-year floodplain. Newer FEMA maps are not available for the area and the site flood hazard remains undetermined.



Source: NPS 2011a.

FIGURE C-1: PREFERRED ALTERNATIVE IN RELATION TO 100-YEAR FLOODPLAIN

Flooding is a natural process that forms and maintains river corridors. Floodplains are generally considered as seldom-used portions of the river channel. Periodic flows of water that overtop riverbanks are the lifeblood of the riparian corridors and marshes. Combined, the seasonal variability of flow and intermittent extreme events determine the physical structure and biological diversity of floodplains. Seasonal and storm-generated variations in water flow, including periodic flooding, are part of the normal function of the floodplain. Inundation of these areas outside the riverbank keeps erosion and accretion in equilibrium, replenishes soils, and recharges groundwater. High flows are critical to maintaining vegetation because they transport sediment and nutrients from the river to the connecting floodplain. The ecological integrity of a floodplain depends on the supply of water, sediment, nutrients, and the stability of vegetation in the flood zone (AFSPM 2008).

In the past, portions of the park as well as areas outside the park adjacent to the Rio Grande have been damaged by flood events. The most significant flood in recent years occurred in 2008 because of tropical depression Lowell, which dropped extreme amounts of precipitation in the Mexican state of Chihuahua, southwest of the park. During this period, a large amount of rainwater flowed into the Rio Conchos watershed (the primary source of water in the Rio Grande as it flows through the park), resulting in the deepest flood in the recorded history of the park. Flows on the river normally 2 to 3 feet deep grew to over 30 feet deep in places. Although damage within the park and nearby area outside the park was

extensive, areas within the immediate vicinity of the proposed project experienced only a slight increase in water levels and negligible to no damage. The site of the proposed visitor contact station was not inundated during this event. The previous flood of significant size was in 1991.

JUSTIFICATION FOR USE OF THE FLOODPLAIN

Alternative locations for the siting of the proposed action do exist. However, the proposed project site best meets project objectives as it is inclusive of those areas historically used when crossing the Rio Grande at Boquillas. Additionally, the majority of soils found at the proposed project site are previously disturbed, which would result in a minimal amount of new disturbance in the park. The siting of the proposed project and types of structures selected would not impede or accelerate high flows or inhibit the ability of the floodplain to disperse the volume and energy of floodwaters from the Rio Grande. Previous extreme flood events on the Rio Grande have resulted in minimal flooding near the proposed project area. No water was present on lands included as part of the proposed project area.

SITE-SPECIFIC FLOOD RISK

Flooding in the vicinity of the proposed project occurs about once every three to five years. During these events, the Rio Grande overflows its banks, flooding areas with 1 to 10 feet of water. Inundation usually lasts from two to 20 days. Floods reaching elevations greater than 10 feet above the average river surface height will occur in only extremely large and rare events.

Along the river, everyday flow velocities can be expected to be very low because the gradient of the Rio Grande is low (about 5 feet per mile) and the floodplain is relatively wide. The combination of these factors makes rapid and dangerous flooding near the proposed project area highly unlikely. The largest floods occurring in the Rio Grande originate from precipitation over a large area and can usually be observed upstream, well in advance of arrival in the park, particularly those areas near the proposed project area.

The most significant flood in recent years occurred in 2008 because of tropical depression Lowell, which dropped extreme amounts of precipitation in the Mexican state of Chihuahua, southwest of the park. During this period, a large amount of rainwater flowed into the Rio Conchos watershed (the primary source of water in the Rio Grande as it flows through the park), resulting in the deepest flood in the recorded history of the park. Flows on the river normally 2 to 3 feet deep grew to over 30 feet deep in places. Although damage within the park and nearby areas outside the park was extensive, the proposed visitor contact station site was not inundated. The previous flood of significant size occurred in 1991.

In the event of a flood, it is anticipated based on FEMA mapping and anecdotal flood evidence that flood waters in and around the proposed project area would be of low depth and velocity. This coupled with the fact the floodwaters would likely be observable upstream well in advance of arrival in the park it is not anticipated that visitors or staff would be at risk or need to be evacuated. In the event of an extreme event, the location of the proposed project would allow visitors and park staff sufficient time to evacuate the area if needed. The proposed project would not facilitate overnight use or habitation of the visitor contact station. As a result, visitors and staff would not be at risk of flood events in the evening.

MITIGATION ACTIONS

During the project development process and construction, minimization and mitigation measures would be applied to reduce impacts to sensitive resources. As mentioned previously, the construction and operation of the preferred alternative would not substantially alter existing grades or drainage patterns on

the proposed project site. Additionally, the preferred alternative site is proposed to be on previously disturbed soils. During initial site preparation, existing vegetation would be removed only as required and to the limits necessary to construct the proposed project.

Erosion and sediment control measures would be designed in accordance with BMPs and specifications for erosion and sediment control as given by the state of Texas. At the onset of construction, stabilized construction entrances would be provided to limit tracking of sediment offsite. Silt fencing would be used to establish perimeter erosion and sediment control around the site limits of disturbance. To limit further erosion, all disturbed areas would be graded to a stable slope. Such measures would be maintained by the contractor/park staff for the duration of construction activities.

Once construction activities are complete, disturbed areas would be graded to match preconstruction conditions, where feasible. Final site restoration would include the seeding of all areas previously disturbed by construction activities. Only native plant seed mixtures approved by park staff would be used. Areas natural before construction would be rehabilitated using native plant materials approved by park staff.

SUMMARY

Although the preferred alternative has the potential to be located just within the 100-year floodplain, siting the proposed project at this location would not result in changes to floodplain function or increases in either upstream or downstream flooding. The visitor contact station would be designed as a low-profile structure to not impede or accelerate high flows or inhibit the ability of the floodplain to disperse the volume and energy of floodwaters from the Rio Grande. Therefore, there would be negligible impacts to floodplain functions or values from the proposed project.



As the nation’s principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historic places, and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

PMIS 165511