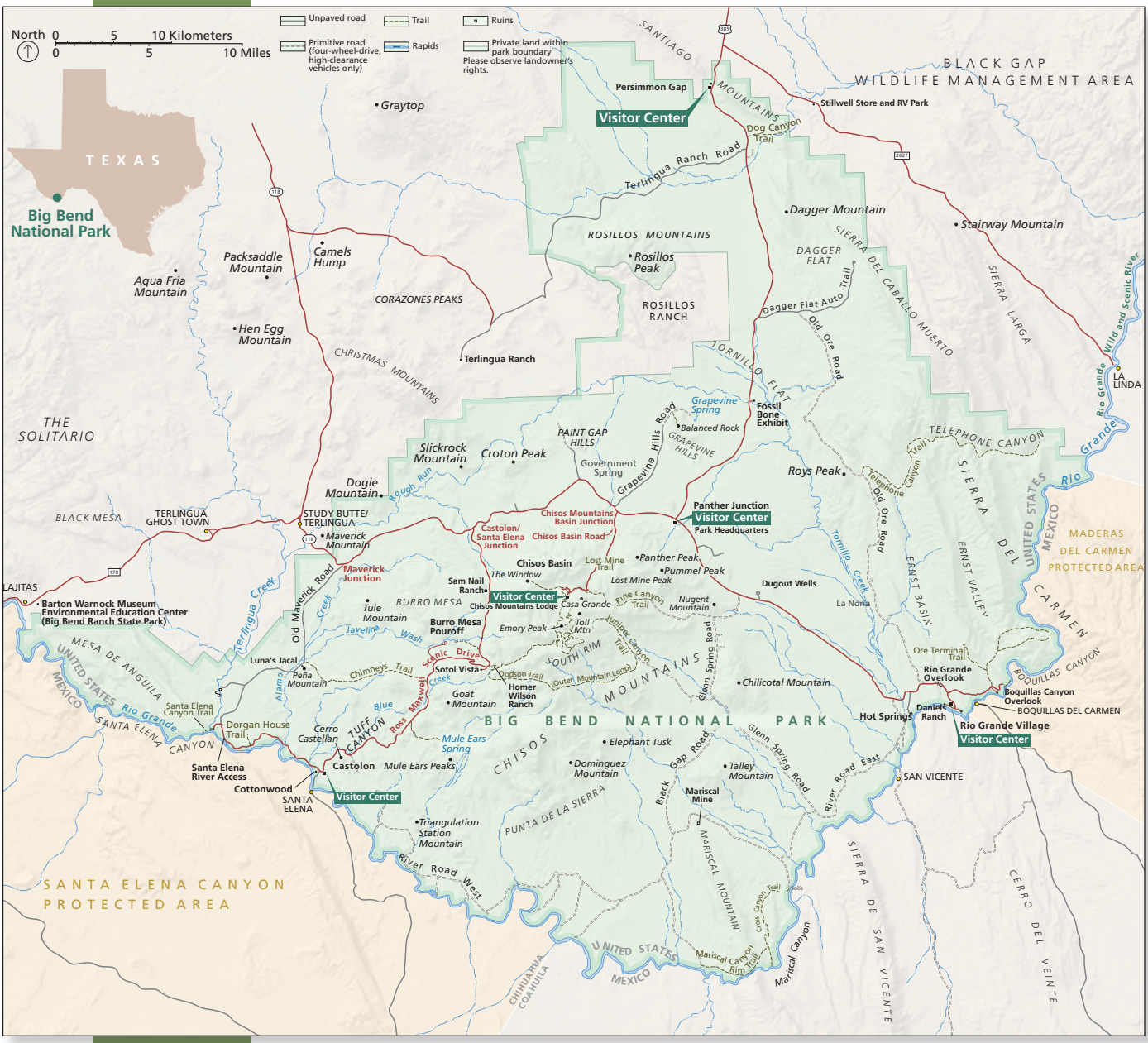
NATIONAL PARK SERVICE • U.S. DEPARTMENT OF THE INTERIOR

Foundation Document

Big Bend National Park

Texas

May 2016


North
0 5 10 Kilometers
0 5 10 Miles
Unpaved road
Primitive road (four-wheel-drive, high-clearance vehicles only)
Trail
Rapids
Ruins
Private land within park boundary
Please observe landowner's rights.
TEXAS
Big Bend National Park
BLACK GAP WILDLIFE MANAGEMENT AREA
Persimmon Gap
Visitor Center
Stillwell Store and RV Park
Graytop
Dog Canyon Trail
Terlingua Ranch Road
Dagger Mountain
Stairway Mountain
ROSILLOS MOUNTAINS
Rosillos Peak
DAGGER FLAT
SIERRA DEL CABALLO MUERTO
SIERRA LARGA
Dagger Flat Auto Trail
ROSILLOS RANCH
Packsaddle Mountain
Camels Hump
Aqua Fria Mountain
CORAZONES PEAKS
Hen Egg Mountain
CHRISTMAS MOUNTAINS
Terlingua Ranch
TORNILLO FLAT
Old Ore Road
Wild and Scenic River
Rio Grande
LA LINDA
THE SOLITARIO
Grapevine Spring
Balanced Rock
Fossil Bone Exhibit
PAINT GAP HILLS
Slickrock Mountain
Croton Peak
Government Spring
Grapevine Hills Road
GRAPEVINE HILLS
TELEPHONE CANYON
Telephone Canyon Trail
Roys Peak
Dogie Mountain
Rough Run
BLACK MESA
TERLINGUA GHOST TOWN
STUDY BUTTE/ TERLINGUA
Maverick Mountain
Chisos Mountains Basin Junction
Castolon/ Santa Elena Junction
Chisos Basin Road
Panther Junction
Visitor Center
Park Headquarters
SIERRA DEL CARMEN
UNITED STATES
MEXICO
MADERAS DEL CARMEN PROTECTED AREA
Chisos Basin
Lost Mine Trail
Panther Peak
Pummel Peak
Lost Mine Peak
Maverick Junction
Sam Nail Ranch
The Window
Visitor Center
Chisos Mountains Lodge
Casa Grande
Pine Canyon Trail
Nugent Mountain
Dugout Wells
La Noria
ERNST VALLEY
ERNST BASIN
Tornillo Creek
LAJITAS
Barton Warnock Museum Environmental Education Center (Big Bend Ranch State Park)
Terlingua Creek
Old Maverick Road
Creek
Tule Mountain
BURRO MESA
Burro Mesa Pouroff
Javelina Wash
Emory Peak
Toll Mtn
Juniper Canyon Trail
SOUTH RIM
Ore Terminal Trail
Rio Grande Overlook
BOQUILLAS CANYON
Boquillas Canyon Overlook
BOQUILLAS DEL CARMEN
MESA DE ANGUILA
Luna's Jacal
Peña Mountain
Chimneys Trail
Scenic Drive
Sotol Vista
Dodson Trail
(Outer Mountain Loop)
Glenn Spring Road
Chilicotal Mountain
Alamo Creek
Goat Mountain
Homer Wilson Ranch
Santa Elena Canyon Trail
Dorgan House Trail
Blue Ross Maxwell
BIG BEND NATIONAL PARK
Daniels Ranch
Hot Springs
Rio Grande Village
Visitor Center
SANTA ELENA CANYON
Cerro Castellan
TUFF CANYON
Mule Ears Spring
Elephant Tusk
Santa Elena River Access
Cottonwood
SANTA ELENA
Visitor Center
Castolon
Mule Ears Peaks
CHISOS
Dominguez Mountain
Talley Mountain
Glenn Spring Road
River Road East
SAN VICENTE
Black Gap Road
Mariscal Mine
PUNTA DE LA SIERRA
Triangulation Station Mountain
River Road West
MARISCAL MOUNTAIN
SIERRA DE SAN VICENTE
CERRO DEL VIENTE
SANTA ELENA CANYON PROTECTED AREA
Mariscal Canyon Rim Trail
Mariscal Canyon
CHIHUAHUA
COAHUILA

Contents

Mission of the National Park Service

The National Park Service (NPS) preserves unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations. The National Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world.

The NPS core values are a framework in which the National Park Service accomplishes its mission. They express the manner in which, both individually and collectively, the National Park Service pursues its mission. The NPS core values are:

- **Shared stewardship**: We share a commitment to resource stewardship with the global preservation community.
- **Excellence**: We strive continually to learn and improve so that we may achieve the highest ideals of public service.
- **Integrity**: We deal honestly and fairly with the public and one another.
- **Tradition**: We are proud of it; we learn from it; we are not bound by it.
- **Respect**: We embrace each other's differences so that we may enrich the well-being of everyone.

The National Park Service is a bureau within the Department of the Interior. While numerous national park system units were created prior to 1916, it was not until August 25, 1916, that President Woodrow Wilson signed the National Park Service Organic Act formally establishing the National Park Service.

The national park system continues to grow and comprises more than 400 park units covering more than 84 million acres in every state, the District of Columbia, American Samoa, Guam, Puerto Rico, and the Virgin Islands. These units include, but are not limited to, national parks, monuments, battlefields, military parks, historical parks, historic sites, lakeshores, seashores, recreation areas, scenic rivers and trails, and the White House. The variety and diversity of park units throughout the nation require a strong commitment to resource stewardship and management to ensure both the protection and enjoyment of these resources for future generations.

The arrowhead was authorized as the official National Park Service emblem by the Secretary of the Interior on July 20, 1951. The sequoia tree and bison represent vegetation and wildlife, the mountains and water represent scenic and recreational values, and the arrowhead represents historical and archeological values.

Introduction

Every unit of the national park system will have a foundational document to provide basic guidance for planning and management decisions—a foundation for planning and management. The core components of a foundation document include a brief description of the park, as well as the park's purpose, significance, fundamental resources and values, other important resources and values, and interpretive themes. The foundation document also includes special mandates and administrative commitments, an assessment of planning and data needs that identifies planning issues, planning products to be developed, and the associated studies and data required for park planning. Along with the core components, the assessment provides a focus for park planning activities and establishes a baseline from which planning documents are developed.

A primary benefit of developing a foundation document is the opportunity to integrate and coordinate all kinds and levels of planning from a single, shared understanding of what is most important about the park. The process of developing a foundation document begins with gathering and integrating information about the park. Next, this information is refined and focused to determine what the most important attributes of the park are. The process of preparing a foundation document aids park managers, staff, and the public in identifying and clearly stating in one document the essential information that is necessary for park management to consider when determining future planning efforts, outlining key planning issues, and protecting resources and values that are integral to park purpose and identity.

While not included in this document, a park atlas is also part of a foundation project. The atlas is a series of maps compiled from available geographic information system (GIS) data on natural and cultural resources, visitor use patterns, facilities, and other topics. It serves as a GIS-based support tool for planning and park operations. The atlas is published as a (hard copy) paper product and as geospatial data for use in a web mapping environment. The park atlas for Big Bend National Park can be accessed online at: http://insideparkatlas.nps.gov/.

Part 1: Core Components

The core components of a foundation document include a brief description of the park, park purpose, significance statements, fundamental resources and values, other important resources and values, and interpretive themes. These components are core because they typically do not change over time. Core components are expected to be used in future planning and management efforts.

Brief Description of the Park

Big Bend National Park, the first national park in Texas, is in south Brewster County and encompasses more than 801,000 acres, including 533,900 acres of recommended wilderness in the Big Bend of the Rio Grande. The Rio Grande flows for 118 miles on the park's southern boundary, through Santa Elena, Mariscal, and Boquillas Canyons, the deepest gorges on the river. In 1978, the US Congress designated a 196-mile section of the Rio Grande a wild and scenic river, 69 miles of which lie on the park boundary. The river forms the international boundary between Mexico and the United States, with the name Big Bend originating from the abrupt change of the Rio Grande's channel from southeasterly to a northeast direction. The park boundary is within the northern portion of the Chihuahuan Desert, which has the most precipitation of all four deserts in North America and one of the most biologically diverse.

The Chisos Mountains, the southernmost range in the continental United States, are completely enclosed in the park and rise over 7,800 feet above sea level. They support relict forests from the Late Pleistocene era of Arizona pine, Douglas-fir, Arizona cypress, quaking aspen, and bigtooth maple. The popular Chisos Basin, a topographic depression in the Chisos mountain range, offers spectacular panoramic vistas and a cool respite from the desert heat for visitors. The park preserves tremendous geological diversity, including marine sedimentary rocks, continental sedimentary rocks, volcanic rocks, and evidence of the three great North American mountain-building episodes. Evidence of geological processes readily visible at the park includes sedimentation, tectonics, erosion, volcanism, and fossilization. Many scientifically significant, impressive, and interesting fossils have been found in the park, including numerous dinosaurs, giant crocodiles, early mammals, petrified wood, and the world's largest known flying creature, a giant pterosaur. With over 1,200 known species of fossils, the park is in the top tier of national park system units for fossil resources.

The park exhibits extreme climate contrast due to the range in elevation, which causes wide variation in moisture and temperature. Altitude ranges from about 1,800 feet along the river to 7,800 feet in the Chisos Mountains. Annual precipitation in the arid to semi-arid climate ranges from 6 inches in the desert to 17 inches in the mountains. Summer days often exceed 100 degrees Fahrenheit (°F) in the lower elevations, and although winters are normally mild throughout the park, subfreezing temperatures occasionally occur. This variation in climate contributes to the extraordinary diversity in plant and animal habitats present in the park. Ranges of typically eastern and typically western species of plants and animals come together or overlap here and many species are at the extreme limits of their ranges. Latin American species, many from the tropics, range this far north, while northern-nesting species often travel this far south in winter. Endangered species found at Big Bend are the black-capped vireo, Mexican long-nosed bat, and Big Bend gambusia (a tiny fish found only in the park). The western subspecies of the yellow-billed cuckoo was listed as threatened in 2014, along with designated critical habitat along the Rio Grande and its tributaries. There are several species in the United States that can only be found in Big Bend—Del Carmen white-tailed deer, Colima warbler, and Mexican drooping juniper. The Chisos agave lives nowhere else in the world.

The park occupies the intersection of the three greatest North American mountain-building episodes: the Ouachita (which created part of the Appalachian Mountains), the Laramide (which created the Rocky Mountains), and the Basin and Range. The rock strata in the park records diverse, complex geologic events and a variety of depositional processes. From 500-million-year-old rocks at Persimmon Gap to modern-day windblown sand dunes at Boquillas Canyon, geologic formations in Big Bend demonstrate amazingly diverse depositional styles over a vast interval of time.

Thousands of archeological sites record the presence of humans in the Big Bend area for the past 13,500 years, demonstrating their survival strategies and their adaptations to changing climatic conditions. The park contains examples (architecture, farming, mining, ranching, etc.) of 19th- and 20th-century developments that highlight the cultural interactions among the people of the United States, Mexico, and American Indian groups, who combined to form a distinctive borderlands culture, and a landscape exhibiting cultural change and the effects of human activities on the land.

In 1976, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) designated Big Bend a "Man and the Biosphere" international reserve, one of only 28 in the United States. Binational collaboration with the government of Mexico in the management of shared natural and cultural resources was strengthened in the 1990s with the establishment of the Maderas del Carmen and Cañon de Santa Elena protected areas. In 2006, these two areas were recognized officially as sister parks, creating one of the largest transboundary protected areas in North America. In 2013, the Boquillas Port of Entry was opened, allowing improved cooperative resource management and research, educational programs, and increased tourism opportunities between the two countries.

Some of the many opportunities for visitors in the park includescenic drives and mountain biking through miles of paved, improved, and dirt roads, a large network of hiking trails, and horseback riding; engaging in river-related activities such as floating the canyons or open water by raft, canoe, or kayak; birding and other wildlife viewing; and camping in one of the four campgrounds in the park or numerous backcountry sites. The remoteness of the park and its distance from major roads, airline routes, and developed areas contributes to its lack of artificial light and noise as well as its wilderness character and ecological diversity.

Park Purpose

The purpose statement identifies the specific reason(s) for establishment of a particular park. The purpose statement for Big Bend National Park was drafted through a careful analysis of its enabling legislation and the legislative history that influenced its development. The park was established when the enabling legislation adopted by Congress was signed into law on June 20, 1935 (see appendix A for enabling legislation). The purpose statement lays the foundation for understanding what is most important about the park.

Big Bend National Park preserves a large area of the Chihuahuan Desert, encompassing spectacular wilderness character, scenic values, natural dark skies, and the biological and geological diversity of the Big Bend area, including the Chisos Mountains and the Rio Grande and its canyons. The park provides for the benefit and recreational enjoyment of the public, with opportunities to experience remoteness and the international flavor of the US-Mexican border, and works cooperatively toward binational management of resources.

Park Significance

Significance statements express why a park's resources and values are important enough to merit designation as a unit of the national park system. These statements are linked to the purpose of Big Bend National Park, and are supported by data, research, and consensus. Statements of significance describe the distinctive nature of the park and why an area is important within a global, national, regional, and systemwide context. They focus on the most important resources and values that will assist in park planning and management.

The following significance statements have been identified for Big Bend National Park. (Please note that the sequence of the statements does not reflect the level of significance.)

1. Big Bend National Park protects the largest and most representative example of the Chihuahuan Desert ecosystem in the United States, which includes the Chisos Mountains—the only mountain range fully contained within a US national park. The river, along with the springs, desert, mountain, and grassland environments, supports extraordinary biological diversity, including endemic and rare plants and animals. Big Bend National Park contains more species of birds, bats, butterflies, scorpions, ants, reptiles, and cacti than any other unit in the National Park Service.

2. Dramatic, diverse, and well-exposed geologic features provide opportunities to study a wide range of sedimentary, igneous, and metamorphic geologic processes in Big Bend National Park. The three great North American mountain-building episodes, which formed the Appalachians, Rockies, and Basin and Range, intersect in the Big Bend region.

3. The numerous scientifically important Cretaceous and Tertiary fossils found in Big Bend National Park record the evolution and history of ancient life from the Age of Reptiles through the Age of Mammals. The park preserves a largely intact 130-million-year slice of geologic time, including the dinosaur extinction event.

4. Big Bend National Park is the core of a greater region in which diverse cultures interacted over a span of more than 13,500 years. The park contains physical remains of human manipulation of the landscape and adaptation to post-Pleistocene climate change. The cultural history includes the long span of American Indian habitation and later contact with European settlers. More recent history includes the military, farmers, ranchers, miners, NPS development, and modern uses.

5. Big Bend National Park, along with Rio Grande Wild and Scenic River, two Texas state parks, and four Mexican protected areas, comprise one of the largest transboundary protected areas in North America, covering 3 million acres and more than 300 miles of the Rio Grande. The binational character of this remote and diverse landscape figures high in visitor experience, as well as management opportunities and challenges.

6. With over 800,000 acres of protected land, Big Bend National Park provides exceptional opportunities to experience primitive desert wilderness, undisturbed natural soundscapes, solitude, world-class dark night skies, clean clear air, and unparalleled scenic vistas extending into Mexico. Recreational and educational experiences include rare bird and wildlife viewing, river floating, international border crossing, hiking, sightseeing, and camping.

Fundamental Resources and Values

Fundamental resources and values (FRVs) are those features, systems, processes, experiences, stories, scenes, sounds, smells, or other attributes determined to warrant primary consideration during planning and management processes because they are essential to achieving the purpose of the park and maintaining its significance. Fundamental resources and values are closely related to a park's legislative purpose and are more specific than significance statements.

Fundamental resources and values help focus planning and management efforts on what is truly significant about the park. One of the most important responsibilities of NPS managers is to ensure the conservation and public enjoyment of those qualities that are essential (fundamental) to achieving the purpose of the park and maintaining its significance. If fundamental resources and values are allowed to deteriorate, the park purpose and/or significance could be jeopardized.

The following fundamental resources and values have been identified for Big Bend National Park:

- **Acoustic Environment, Scenic Views, and Air Quality –** The prevalence of clean, clear air and low light pollution provides a high-quality night sky, nighttime environment, and vast, unobscured scenic vistas. The pervasive natural sounds and quiet have a profound effect on the quality of many other park resources, including wildlife, wilderness character, visitor experience, and cultural landscapes. The combination of these conditions provides unique opportunities for visitors to enjoy the primitive character of the area, a sense of remoteness and solitude, self-reliant recreation, and the experience of a star-filled sky and quality nighttime recreation in a landscape absent anthropogenic light and sound.
- **Border Culture –** Big Bend National Park is a land of borders. Situated on the boundary with Mexico, along the Rio Grande, it is a place where countries and cultures meet, creating a unique border culture characterized by its food, music, architecture, language, art, and independent and self-reliant people. Family ties and shared experiences in ranching, farming, recreation, and mining have knit the small communities of the region together in a shared history, supporting cultural diversity and understanding.

- **Cultural Resources and History –** Cultural resources in the park range from the Paleo-Indian period (13,500 years before present) through the Historic period, represented by American Indian groups such as the Chisos, Mescalero Apaches, and Comanches. More recently, Spanish, Mexican, and American settlers farmed, ranched, and mined the area. The archeological record reveals an Archaic period desert culture whose inhabitants developed a nomadic hunting and gathering lifestyle that remained virtually unchanged for several thousand years. In more recent times, the park has been used for various subsistence or commercial land uses and, after the area's designation as a national park, for tourism and recreation. Big Bend contains eight national register historic districts or sites and more than 2,000 recorded archeological and historical sites. The park collections inventory lists almost 121,500 items, including archeological, historical, archival, biological, paleontological, and geological items.

- **Ecosystem and Biological Diversity –** The river, desert, and mountain environments of the park support an extraordinary richness of biological diversity, including endemic plants and animals. The park features broad expanses of Chihuahuan Desert shrubland and grassland, a high elevation woodland in the Chisos Mountains, as well as riparian and wetland areas that line the Rio Grande and over 300 associated water sources throughout the park. This varied landscape of wooded mountains, mid-elevation shrublands, and sparse, arid lowlands supports outstanding biological diversity, including habitat for over 1,300 species of vascular plants, 450 species of birds, 190 butterfly species, 78 mammal species, 59 species of cactus, 56 different reptiles, 11 different amphibians, and various federally threatened and endangered animal and plant species. The ecological integrity of Big Bend National Park and the greater reach of the Rio Grande depend on one another.

- **International Cooperation and Regional Collaboration –** Along with the protected areas of Reserva de la Biosfera Maderas del Carmen, Área de Protección de Flora y Fauna Cañon de Santa Elena, Área de Protección de Flora y Fauna Ocampo, Monumento Natural Río Bravo del Norte in Mexico, Black Gap Wildlife Management Area, and Big Bend Ranch State Park, Big Bend National Park is part of one of the largest transboundary protected areas in North America. More than 3 million acres of Chihuahuan Desert resources, along with more than 300 miles of river, are under the national protection of the United States, the State of Texas, and Mexico. Maintaining strong cross-boundary environmental cooperation between the United States and Mexico is fundamental for the continued conservation of this natural area of binational significance.

- **Physical Resources –** More than 1,250 square miles of Big Bend is nationally important as the largest protected area of Chihuahuan Desert topography and ecology in the United States. Wide arid alluvial plains thrive on constant drought, while many elements of this biologically diverse ecosystem are dependent on numerous perennial, intermittent, and ephemeral streams and the Rio Grande. Due to the significant variety of soils and elevation ranging from about 1,800 feet along the river to 7,800 feet in the Chisos Mountains, microclimates vary across the park, and this variety contributes to an exceptional diversity of habitats. Few areas exceed the value of the park for the protection and study of paleontologic and geologic resources. Over 1,200 species of Cretaceous and Tertiary fossils are known from the park, including scientifically important specimens found nowhere else. Big Bend is the only known national park system unit that contains strata deposited during the great dinosaur extinction event at the end of the Cretaceous period. The varied geology provides a clearly visible geologic time line. Geologic deposits are remarkably diverse, containing intrusive and extrusive igneous rocks, metamorphic rocks, and marine, coastal, and continental sedimentary rocks.
- **Recreation and Education –** Described as the "last great wilderness" of Texas, the mixed terrain of Big Bend, from low deserts to the Chisos Mountains, offers many recreational opportunities, including automobile touring, hiking, backpacking, camping, bicycling, horseback riding, and river recreation. The park is an international draw for bird-watching and offers opportunities for star gazing, wildlife viewing, and photography. Diverse resources provide numerous ways for visitors to connect with, understand, and appreciate the natural and human history of the region. A variety of trails with a range of challenges provide access to the Chisos Mountains and to a diversity of desert habitats. Much of the park is trail-less, providing opportunities for wilderness exploration, solitude, and unconfined recreation.

Other Important Resources and Values

Big Bend National Park contains other resources and values that are not fundamental to the purpose of the park and may be unrelated to its significance, but are important to consider in planning processes. These are referred to as "other important resources and values" (OIRV). These resources and values have been selected because they are important in the operation and management of the park and warrant special consideration in park planning.

The following other important resources and values have been identified for Big Bend National Park:

- **Research and Partnerships –** Big Bend protects a diverse array of habitats considered to be biological islands, making the park an important research environment with numerous partners. Endemism, extreme biological diversity, and on-site collections provide opportunities for scientific study and cooperation with numerous institutions that represent a full range of disciplines and contribute to the understanding of park resources.

Interpretive Themes

Interpretive themes are often described as the key stories or concepts that visitors should understand after visiting a park—they define the most important ideas or concepts communicated to visitors about a park unit. Themes are derived from, and should reflect, park purpose, significance, resources, and values. The set of interpretive themes is complete when it provides the structure necessary for park staff to develop opportunities for visitors to explore and relate to all park significance statements and fundamental other important resources and values.

Interpretive themes are an organizational tool that reveal and clarify meaning, concepts, contexts, and values represented by park resources. Sound themes are accurate and reflect current scholarship and science. They encourage exploration of the context in which events or natural processes occurred and the effects of those events and processes. Interpretive themes go beyond a mere description of the event or process to foster multiple opportunities to experience and consider the park and its resources. These themes help explain why a park story is relevant to people who may otherwise be unaware of connections they have to an event, time, or place associated with the park.

The following interpretive themes have been identified for Big Bend National Park:

- The convergence of desert, mountain, and river ecosystems in Big Bend National Park supports a remarkable diversity of life and provides abundant opportunities to experience and learn about the natural world.
- Big Bend's rugged and remote wilderness, spectacular river canyons, vast expanses, panoramic vistas, clean clear air, dark night skies, and proximity to Mexico provide outstanding recreational opportunities and inspire wonder, reflection, and rejuvenation.
- For thousands of years, the Big Bend region has been a focus of human activity—bringing people together from all directions, sometimes in harmony and sometimes in conflict.
- Survival strategies and adaptations of living things in the Chihuahuan Desert are as wondrous as the environment is extreme—often defying our expectations about the ability of life to thrive in such conditions.
- Abundant fossils in Big Bend National Park, including some found nowhere else in the world, record the existence and demise of dinosaurs and the flourishing of mammals, enabling us to ponder evolution and our own impermanence in the world.
- Diverse, well-exposed, and accessible geologic features enable us to learn about the processes that shaped, and continue to shape the Earth and influence its inhabitants.
- Although the life-giving Rio Grande has attracted peoples for centuries, it also provides cooperative transboundary management opportunities for the United States and Mexico to ensure mutual benefit.

Part 2: Dynamic Components

The dynamic components of a foundation document include special mandates and administrative commitments and an assessment of planning and data needs. These components are dynamic because they will change over time. New special mandates can be established and new administrative commitments made. As conditions and trends of fundamental and other important resources and values change over time, the analysis of planning and data needs will need to be revisited and revised, along with key issues. Therefore, this part of the foundation document will be updated accordingly.

Special Mandates and Administrative Commitments

Many management decisions for a park unit are directed or influenced by special mandates and administrative commitments with other federal agencies, state and local governments, utility companies, partnering organizations, and other entities. Special mandates are requirements specific to a park that must be fulfilled. Mandates can be expressed in enabling legislation, in separate legislation following the establishment of the park, or through a judicial process. They may expand on park purpose or introduce elements unrelated to the purpose of the park. Administrative commitments are, in general, agreements that have been reached through formal, documented processes, often through memorandums of agreement. Examples include easements, rights-of-way, arrangements for emergency service responses, etc. Special mandates and administrative commitments can support, in many cases, a network of partnerships that help fulfill the objectives of the park and facilitate working relationships with other organizations. They are an essential component of managing and planning for Big Bend National Park.

For more information about the existing special mandates and administrative commitments for Big Bend National Park, please see appendix C.

Assessment of Planning and Data Needs

Once the core components of part 1 of the foundation document have been identified, it is important to gather and evaluate existing information about the park's fundamental and other important resources and values, and develop a full assessment of the park's planning and data needs. The assessment of planning and data needs section presents planning issues, the planning projects that will address these issues, and the associated information requirements for planning, such as resource inventories and data collection, including GIS data.

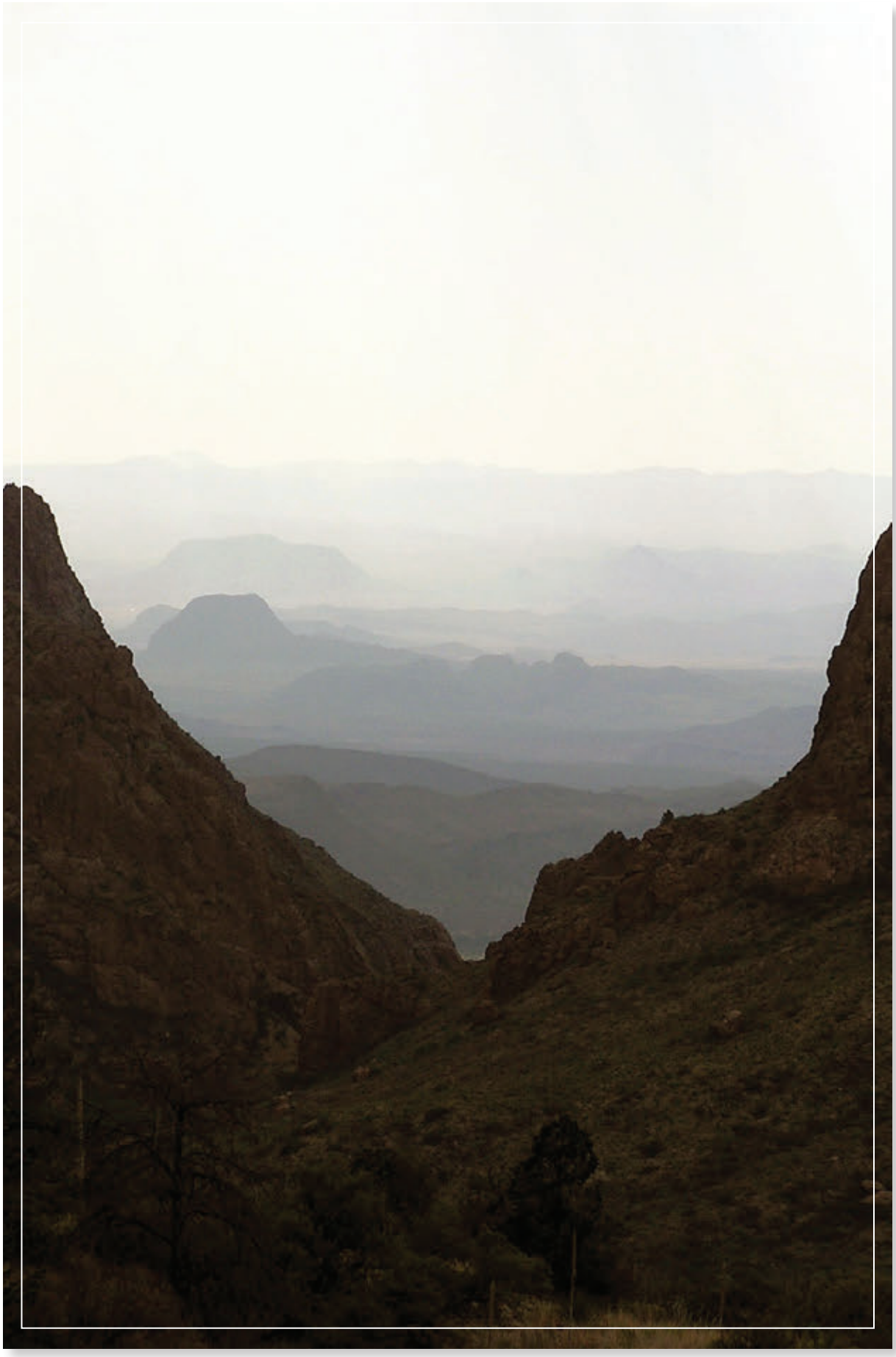
There are three sections in the assessment of planning and data needs:

1. analysis of fundamental and other important resources and values
2. identification of key issues and associated planning and data needs
3. identification of planning and data needs (including spatial mapping activities or GIS maps)

The analysis of fundamental and other important resources and values and identification of key issues leads up to, and supports the identification of planning and data collection needs.

Analysis of Fundamental Resources and Values

The fundamental resource or value analysis table includes current conditions, potential threats and opportunities, planning and data needs, and selected laws and NPS policies related to management of the identified resource or value.



Fundamental Resource or Value	Acoustic Environment, Scenic Views, and Air Quality
Related Significance Statements	• With over 800,000 acres of protected land, Big Bend National Park provides exceptional opportunities to experience primitive desert wilderness, undisturbed natural soundscapes, solitude, world-class dark night skies, clean clear air, and unparalleled scenic vistas extending into Mexico. Recreational and educational experiences include rare bird and wildlife viewing, river floating, international border crossing, hiking, sightseeing, and camping.
Current Conditions and Trends	**Conditions** • Big Bend is part of a large-scale air resource protection program to determine the potential impact of local and distant pollutant sources on the area. • Big Bend is a class I airshed as defined by the Clean Air Act, requiring the most stringent air quality protection within and around park boundaries. Both particulate and visibility aspects of air quality have been monitored since 1978. The park has air quality data since 1985. • Despite Big Bend's remote location in rural southwest Texas, air quality conditions in the park are degraded at times and vary significantly depending on the season. • Particulate sulfate compounds have been the primary contributor to haze in the park. • Visibility conditions at the park are of moderate concern based on NPS Air Resources Division benchmarks as daytime views are sometimes obscured by pollution-caused haze. At night, air pollution scatters artificial light, increasing the impact of light pollution to night skies. • Road repair and mining activities add to minor visibility impacts. • Emissions from coal-burning power plants and other industrial operations in eastern Texas, the Gulf Coast, other parts of the southern and eastern United States, and northeastern and central Mexico travel to the park on prevailing summer winds, reducing visibility and depositing nitrogen and sulfur. • Sulfur deposition, ozone concentration, particulate matter, and visibility are considered to be of moderate concern. • The night sky quality at the park is in excellent condition and has the least light pollution of any other national park system unit in the lower 48 states. • The park has achieved gold-tier status as an International Dark Sky Park. • Outside park development, most notably around Study Butte, Terlingua, Terlingua Ranch, and Boquillas areas, has negatively impacted the viewshed. • Encroaching energy development, including powerlines and structures, are already obstructing scenic views along roads, trails, and key resource areas. • The quality of natural sounds in the park is excellent and has very few intrusive sounds. • Border security activities, motor vehicles, particularly motorcycles, recreational vehicle generators, park construction activities, and aircraft overflights are some of the more common sources of human-caused sounds. • Localized ambient sound level inventories have been completed in the park. There is a need for additional comprehensive baseline surveys throughout the park. • With the exception of air pollution, wilderness character has remained intact. **Trends** • From 2003–2012, the trend in visibility remained relatively unchanged. • Increasing intrusion of light pollution from external sources, including electricity and lighting developments in Boquillas, Mexico. • Park has taken steps to retrofit park lighting to decrease night skies impacts and continues to work in the preservation of natural nighttime light levels in the park. • A report on wilderness character monitoring is planned for implementation in Big Bend during 2015. The report will establish a framework for monitoring trends in five qualities of wilderness character, including solitude, undeveloped, and natural.

Fundamental Resource or Value	Acoustic Environment, Scenic Views, and Air Quality
Threats and Opportunities	**Threats** • Air quality and scenic resources, including night skies, are impacted by international, regional, and local sources of air pollution such as power plants, oil and gas development, industrial facilities, agriculture, and urban developments. • Visibility and air quality are degrading due to activities outside the park (i.e., fires, development, farming, petroleum development, etc.). • Increased development outside park boundaries, with the associated light pollution and increased sounds, has the potential to negatively impact ecological processes and visitor experience. • Views could be affected by the addition of shopping and infrastructure facilities to accommodate the growing population of Terlingua and surrounding areas. • Encroaching energy development and subsequent water use, along with powerlines and structures, are already obstructing scenic views along roads, trails, and key resource areas and have the potential to impact air quality, dark skies, and noise levels. • The Terlingua Ranch development is an expanding residential area considered one of the major threats to the park viewshed. Developments can be seen from the park, and expansion is expected to continue on these private lands in the future. • Growth is expected from the newly opened border town of Boquillas, Mexico, which could impact the scenic views east of the park. • The near-pristine conditions result in a situation where even small increments of anthropogenic light are easy to detect as a change from natural conditions. At night, air pollution scatters artificial light, increasing the impact of light pollution to the night sky. • The towns of Study Butte, Terlingua, Lajitas, and Boquillas, as well as other infrastructure in the park (e.g., light poles) and the expansion of Terlingua Ranch, have a high potential to affect the pristine night sky of the park. • The Chisos Basin development has the greatest potential for adverse impact on night sky quality in the park via outdoor lights. • Additional electrical development could also be expected in other border towns of Mexico, impacting night sky quality. • Advancing technology around the area (telephone towers, solar plants, overflights, expanded airport in Lajitas) has the potential to adversely impact the viewshed and acoustic environment of the park. • Low-level military overflights and their effect on human safety and wildlife. • Increased development of petroleum resources in the Permian Basin is a new source of atmospheric pollution, which is increasingly visible. There is the potential for petroleum development to the west in the surrounding areas of Ojinaga, Mexico. **Opportunities** • Collaborate with the University of Texas McDonald Observatory for night sky protection. • Continue to fund and manage the Big Bend air quality monitoring program and station, established in 1978, which works with the US Environmental Protection Agency, Texas Commission on Environmental Quality, NPS Air Resources Division, and other federal and state agencies to monitor present conditions of park air quality. • Engage with local community and county governments regarding lighting management. • Reach out to Study Butte, Terlingua, and Boquillas to encourage the use of full cutoff outdoor lights and light management technologies that would eliminate light trespass visible from the park. • Assess impacts of street lights in Santa Elena, Mexico, on light pollution in the Castolon developed area of the park and work with the local electric company on solution. • Continue removal of unused powerlines in the park.

Fundamental Resource or Value	Acoustic Environment, Scenic Views, and Air Quality
Threats and Opportunities	**Opportunities (continued)** • Continue improving the implementation of night skies-friendly lighting. • Continue interpretive program that includes the importance of night skies. • Establish stronger relationship with NPS Natural Sounds and Night Skies Division and other national park system units for resource research and monitoring. • Pursue opportunities within park management to reduce noise through practices such as retrofitting or replacing equipment, timing loud activities for certain times of day, and considering decibel levels when making new purchases. • Engage motorcycle community, using national program as lead, to minimize the effects of noise on wildlife, visitors, the acoustic environment, and other park resources.
Existing Data and Plans Related to the FRV	• *Air Quality Monitoring Protocol and Standard Operating Procedures for the Sonoran Desert, Southern Plains, and Chihuahuan Desert Networks* (2010). • *Big Bend National Park Acoustical Monitoring 2010.* • *Big Bend Regional Aerosol and Visibility Observational Study (BRAVO)* (2004). • 2004 Night Sky Evaluation Report. • *Big Bend National Park Texas Backcountry Management Plan* (1995). • 1990–2002 annual data summaries of gaseous pollutant and meteorological monitoring at Big Bend National Park. • Air quality monitoring in the park includes: ozone monitoring (NPS Gaseous Pollutant Monitoring Program), wet deposition monitoring of atmospheric pollutants, including nitrogen and sulfur (National Atmospheric Deposition Program – CASTNet), and visibility monitoring (Interagency Monitoring of Protected Visual Environments Program).
Data and/or GIS Needs	• Acoustic and night skies monitoring (increase frequency and sample locations). • Air quality data (update). • Catalog into the Interior Collections Management System all specimens (if existing) and associated field records resulting from studies and resource protection efforts. • Continue to operate air quality station at K-Bar, Big Bend, to obtain daily, weekly, and annual data. • Data to establish baseline acoustic quiet zones. • GIS of current park infrastructure (update). • Lighting inventory (update). • Visual resource inventory. • Wilderness character assessment.
Planning Needs	• Comprehensive / long-range interpretive plan (update). • Plan for natural light and soundscape management. • Scenery conservation strategy.

Fundamental Resource or Value	Acoustic Environment, Scenic Views, and Air Quality
Laws, Executive Orders, and Regulations That Apply to the FRV, and NPS Policy-level Guidance	**Laws, Executive Orders, and Regulations That Apply to the FRV** • Clean Air Act • Museum Property Act • National Parks Air Tour Management Act • National Parks Overflight Act • Noise Control Act • Telecommunications Act • Executive Order 13101, "Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition" • Executive Order 13423, "Strengthening Federal Environmental, Energy, and Transportation Management" • Executive Order 13514, "Federal Leadership in Environmental, Energy, and Economic Performance" • "Resource Protection, Public Use, and Recreation" (36 CFR 2) • "Audio disturbances" (36 CFR 2.12) • "What is the maximum noise level for the operation of a vessel?" (36 CFR 3.15) • "Rights-of-Way" (36 CFR 14) • Secretarial Order 3289, "Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources" **NPS Policy-level Guidance (NPS *Management Policies 2006* and Director's Orders)** • Director's Order 6: *Interpretation and Education* • Director's Order 18: *Wildland Fire Management* • NPS *Reference Manual 18: Wildland Fire Management* • *Interagency Burned Area Emergency Response Guidebook* • Director's Order 24: *Museum Collections Management* • Director's Order 25: *Land Protection* • Director's Order 32: *Cooperating Associations* • Director's Order 41: *Wilderness Stewardship* • NPS *Reference Manual 41: Wilderness Stewardship* • NPS *Reference Manual 53: Reference Manual Special Park Uses* • Director's Order 47: *Soundscape Preservation and Noise Management* • *NPS-75 Natural Resources Inventory and Monitoring Guideline* • NPS *Natural Resource Management Reference Manual 77*

Fundamental Resource or Value	Border Culture
Related Significance Statements	• Big Bend National Park is the core of a greater region in which diverse cultures interacted over a span of more than 13,500 years. The park contains physical remains of human manipulation of the landscape and adaptation to post-Pleistocene climate change. The cultural history includes the long span of American Indian habitation and later contact with European settlers. More recent history includes the military, farmers, ranchers, miners, NPS development, and modern uses. • With over 800,000 acres of protected land, Big Bend National Park provides exceptional opportunities to experience primitive desert wilderness, undisturbed natural soundscapes, solitude, world-class dark night skies, clean clear air, and unparalleled scenic vistas, extending into Mexico. Recreational and educational experiences include rare bird and wildlife viewing, river floating, international border crossing, hiking, sightseeing, and camping.
Current Conditions and Trends	**Conditions** • With immigration documentation, the Boquillas Port of Entry directly accesses both countries. • The atmosphere of rural Mexico can be directly experienced by crossing the border adjacent to the park, but only one port of entry allows that access. • Adjacent Mexican communities have been adversely impacted economically by border closures. • Prior to the 2001 closing of the border, visitors could access Mexico at Boquillas, San Vicente, Santa Elena, and Lajitas. Only one such crossing exists now. • Larger community continues to be impacted by border closures. • Distinct border culture is still present. • Annual International Good Neighbor Day Fiestas ended in 2001 with border closure. • Current NPS Intermountain Region funding program (Southwest Border Resource Protection Program) helps maintain working relationships with Mexico counterparts. The Commission on Environmental Cooperation has funded community assessment, restoration, and tourism planning projects in and around the community of Boquillas, Mexico. • Gateway communities are invested in process of expanding border crossing, cross-border cooperation, organized community events, and continued community building in general. • Binational wildland fire management currently in place, including Los Diablos fire crew, which supports firefighting and fuel reduction in the United States. • Since 2006, Big Bend National Park has been working with sister parks across the Rio Grande, including Maderas del Carmen, Ocampo, and Cañon de Santa Elena. After the opening of the Boquillas Port of Entry, annual work plans on shared resources have been implemented since 2013. • Binational and cooperative resources management includes Rio Grande riparian vegetation management, tributary inventory and restoration, and water source inventory and assessment. **Trends** • Increased development of Mexican communities adjacent to park. • The area's population has been slowly increasing. • Larger immigration, economy, and border security issues have influenced community. • Less flexibility to accomplish binational goals due to broader political issues and bureaucracy.

Fundamental Resource or Value	Border Culture
Threats and Opportunities	**Threats** • Misperception about border security and safety at the national and regional levels, which leads to a perceived need for an intense security response. • Illegal activities across border. • New infrastructure associated with an increase in mining, oil, and gas development on both sides of the border would change the traditional border culture. • Commercial development and community growth may change border culture. • Threat of night sky pollution will occur when streetlights and exterior lighting on homes are installed in Boquillas. • Modernization of border communities threatens the rural ambience that has characterized the regional border culture. • Challenges of obtaining required documentation for Mexican nationals to cross the border, which threatens continuation of community traditions. **Opportunities** • Reinitiate annual International Good Neighbor Day Fiestas. • Reinstitute cross-border environmental education. • The Boquillas Port of Entry allows access to and development of ecotourism and heritage tourism. Efforts to establish additional border crossings should be pursued. • Expand binational resource stewardship through cooperative resource inventories and assessments. • Engaging local communities on sustainable/compatible development. • Improve coordination on port of entry hours and crossing. • Work with desert landscape conservation cooperative to increase cross-border resource stewardship. • Strengthen/rejuvenate and sustain outreach to local US schools. • Partner with agencies, nongovernmental organizations, tribes, and local communities on natural and cultural issues. • Engage and coordinate with regional planning on development (building, lighting, septic, trash). • Continue collaboration with Los Diablos firefighting crew.
Existing Data and Plans Related to the FRV	• Administrative history. • Books and historic accounts of earlier human activity in the region.
Data and/or GIS Needs	• Catalog into the Interior Collections Management System all specimens (if existing) and associated field records resulting from studies and resource protection efforts. • Data on changing patterns in development on both sides, including update of 1994 report on economic activities south of Big Bend (i.e., Carrera report). • Data on oil and gas development in the region on both sides of the border and possible impacts on water resources. • Data on water source locations and condition. • Economic valuation of ecosystem services. • Ethnographic overview and assessment. • Oral histories. • Visitor use patterns and trends; document public visitation and legal border crossing.

Fundamental Resource or Value	Border Culture
Planning Needs	• Comprehensive / long-range interpretive plan (update). • Ecotourism / heritage tourism strategy and plan. • Exotic species management plans (finalize). • Resource stewardship strategy.
Laws, Executive Orders, and Regulations That Apply to the FRV, and NPS Policy-level Guidance	**Laws, Executive Orders, and Regulations That Apply to the FRV** • Archeological and Historic Preservation Act • Federal Lands Recreation Enhancement Act • Historic Sites Act • Museum Property Act • National Historic Preservation Act, as amended • Executive Order 11593, "Protection and Enhancement of the Cultural Environment" • Executive Order 13175, "Consultation and Coordination with Indian Tribal Governments" • Executive Order 13287, "Preserve America" • Executive Order 13352, "Facilitation of Cooperative Conservation" • "Resource Protection, Public Use, and Recreation" (36 CFR 2) • "Protection of Historic Properties" (36 CFR 800) • Secretarial Order 3289, "Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources" **NPS Policy-level Guidance (NPS *Management Policies 2006* and Director's Orders)** • Director's Order 6: *Interpretation and Education* • Director's Order 7: *Volunteers in Parks* • Director's Order 17: *National Park Service Tourism* • Director's Order 18: *Wildland Fire Management* • NPS *Reference Manual 18: Wildland Fire Management* • *Interagency Burned Area Emergency Response Guidebook* • Director's Order 24: *Museum Collections Management* • Director's Order 25: *Land Protection* • Director's Order 28: *Cultural Resource Management* • NPS-28: *Cultural Resource Management* • Director's Order 32: *Cooperating Associations* • Director's Order 42: *Accessibility for Visitors with Disabilities in National Park Service Programs and Services* • Director's Order 47: *Soundscape Preservation and Noise Management* • Director's Order 75A: *Civic Engagement and Public Involvement* • Department of the Interior Policy on Consultation with Indian Tribes


CASTOLON STORE
VISITOR CENTER

Fundamental Resource or Value	Cultural Resources and History
Related Significance Statements	• Big Bend National Park is the core of a greater region in which diverse cultures interacted over a span of more than 13,500 years. The park contains physical remains of human manipulation of the landscape and adaptation to post-Pleistocene climate change. The cultural history includes the long span of American Indian habitation and later contact with European settlers. More recent history includes the military, farmers, ranchers, miners, NPS development, and modern uses.
Current Conditions and Trends	**Conditions** • Oldest archeological site in Chisos Mountains is currently under the visitor center. • Only 10% of the park has been surveyed for cultural resources. • The park site inventory contains over 2,800 sites, and it is estimated that 28,000 archeological sites exist in the park. • There are 67 listed classified structures in the park that represent late 19th- and early 20th-century history and regional architecture. • Burro Mesa Archeological District is in fair to good condition. There is no special protection for the district other than restricted camping. • Indian Head is a major prehistoric center that is accessible directly from outside the park and is receiving increased visitation. • Three sites currently publicized for visitation. • Currently there is no exhibit of archeological or historical object specimens. Archeology and history are inadequately interpreted. • Eleven major cultural landscapes have been identified for the park, but inventories do not exist for them at this time. • Annual site condition assessments are conducted for between 30 and 50 sites. • Since 2008, the collection is being protected in a secured temperature and humidity regulated facility. • The park collection requires monitoring, conservation, and protection, and proper catalog management, which includes annual inventory and condition assessments that are not currently being performed due to loss of curatorial staff. • Cataloging system does not provide sufficient indexing to extract the location of archival documents when they are needed for historical research or referencing for management needs. **Trends** • Increased visitation of Indian Head site. • Monitoring, conservation, and protection of park collection, and proper catalog management, which include annual inventory and condition assessments, are stagnant due to loss of curatorial staff.
Threats and Opportunities	**Threats** • Lack of resources needed to document condition of historic structures and maintain park collection and nationally significant structures. • Staff reductions may hinder the continuation of monitoring and performance of condition assessments. • Erosion, weathering, vandalism, illegal collecting, flooding, collapse, and benign neglect threaten the cultural landscape of the park. • Changing environmental conditions and increasing number of large fires pose a threat and may result in loss of cultural resources. • Damage of fragile desert ecosystem and cultural resources by trespassing livestock. • Effects of climate change, including increased fire and fuel loading, extreme river flooding, nonnative vegetation, and decreased channel capacity. • Mission 66 campground landscape at Rio Grande Village is threatened by death/mortality of gallery trees in the campground, picnic areas, and group sites. Deteriorating irrigation system and difficulty in delivering river water cause drought conditions on the campground landscape, impacting visitor experience and resources.

Fundamental Resource or Value	Cultural Resources and History
Threats and Opportunities	**Opportunities** • Increase number of sites available for visitors to experience. • Add cultural resource exhibits that interpret the variety of cultural resources in the various parts of the park. Each visitor center should interpret the historical events and sites within that part of the park. • Outreach to community for educational purposes. • Increase wildland fire messaging to educate public on wildfire risks. • Advanced use of technology to monitor resources. • Increase interest in further research with universities. • Continue to collaborate with Fort Davis National Historic Site for historic preservation, including masonry, adobe, and wood.
Existing Data and Plans Related to the FRV	• 1994 collection management plan. • Comprehensive archeological survey. • Cultural resource component of the 1995 resource management plan. • Historic resource management plans.
Data and/or GIS Needs	• Archeological overview and assessment (revise). • Climate change vulnerability assessment. • Condition assessment of historic structures (annual updates). • Cultural GIS data (update). • Cultural landscape inventories. • Digitize museum archival collections. • GIS model for protection of archeological sites. • List of Classified Structures database (update). • Survey remaining archeological sites, particularly riparian corridors. • Visitor use patterns and trends; documenting public visitation and legal border crossing.
Planning Needs	• Collection management plan (update). • Comprehensive / long-range interpretive plan (update). • Cultural research scientific strategy. • Education and outreach plan. • Historic buildings preservation plans. • Monitoring plan for cultural sites.
Laws, Executive Orders, and Regulations That Apply to the FRV, and NPS Policy-level Guidance	**Laws, Executive Orders, and Regulations That Apply to the FRV** • American Indian Religious Freedom Act • Antiquities Act • Archeological and Historic Preservation Act • Archaeological Resources Protection Act • Historic Sites Act • Management of Museum Properties Act • National Historic Preservation Act, as amended • Native American Graves Protection and Repatriation Act • Religious Freedom Restoration Act • Executive Order 11593, "Protection and Enhancement of the Cultural Environment" • Executive Order 13007, "Indian Sacred Sites" • Executive Order 13175, "Consultation and Coordination with Indian Tribal Governments" • Executive Order 13287, "Preserve America" • "Resource Protection, Public Use, and Recreation" (36 CFR 2)

Fundamental Resource or Value	Cultural Resources and History
Laws, Executive Orders, and Regulations That Apply to the FRV, and NPS Policy-level Guidance	**Laws, Executive Orders, and Regulations That Apply to the FRV (continued)** • "National Register of Historic Places" (36 CFR 60) • "Procedures for State, Tribal, and Local Government Historic Preservation Programs" (36 CFR 61) • *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (36 CFR 68) • "Curation of Federally-Owned and Administered Archeological Collections" (36 CFR 79) • "Protection of Historic Properties" (36 CFR 800) • "Preservation of American Antiquities" (43 CFR 3) • "Protection of Archeological Resources" (43 CFR 7) • Secretarial Order 3289, "Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources" **NPS Policy-level Guidance (NPS *Management Policies 2006* and Director's Orders)** • Director's Order 6: *Interpretation and Education* • Director's Order 14: *Resource Damage Assessment and Restoration* • NPS *Damage Assessment and Restoration Handbook* • Director's Order 18: *Wildland Fire Management* • NPS *Reference Manual 18: Wildland Fire Management* • *Interagency Burned Area Emergency Response Guidebook* • Director's Order 24: *NPS Museum Collections Management* • *NPS Museum Handbook,* parts I, II, and III • Director's Order 25: *Land Protection* • Director's Order 28: *Cultural Resource Management* • NPS-28: Cultural Resource Management Guideline • Director's Order 28A: *Archeology* • Director's Order 32: *Cooperating Associations* • NPS *Guidelines for the Treatment of Cultural Landscapes* • *The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation* • Department of the Interior Policy on Consultation with Indian Tribes

Fundamental Resource or Value	Ecosystem and Biological Diversity
Related Significance Statements	• Big Bend National Park protects the largest and most representative example of the Chihuahuan Desert ecosystem in the United States, which includes the Chisos Mountains—the only mountain range fully contained within a US national park. The river, along with the springs, desert, mountain, and grassland environments, supports extraordinary biological diversity, including endemic and rare plants and animals. Big Bend National Park contains more species of birds, bats, butterflies, scorpions, ants, reptiles, and cacti than any other unit in the National Park Service. • Dramatic, diverse, and well-exposed geologic features provide opportunities to study a wide range of sedimentary, igneous, and metamorphic geologic processes in Big Bend National Park. The three great North American mountain-building episodes, which formed the Appalachians, Rockies, and Basin and Range, intersect in the Big Bend region. • Big Bend National Park, along with Rio Grande Wild and Scenic River, two Texas state parks, and four Mexican protected areas, comprise one of the largest transboundary protected areas in North America, covering 3 million acres and more than 300 miles of the Rio Grande. The binational character of this remote and diverse landscape figures high in visitor experience, as well as management opportunities and challenges. • With over 800,000 acres of protected land, Big Bend National Park provides exceptional opportunities to experience primitive desert wilderness, undisturbed natural soundscapes, solitude, world-class dark night skies, clean clear air, and unparalleled scenic vistas extending into Mexico. Recreational and educational experiences include rare bird and wildlife viewing, river floating, international border crossing, hiking, sightseeing, and camping.
Current Conditions and Trends	**Conditions** • Many nonnative species are present in the park. • The Rio Grande is significantly impacted by an increase in riparian vegetation, nonnative vegetation, and subsequent loss and alteration of aquatic habitat. • Loss of gallery forests of willow and cottonwood on Rio Grande tributaries represent the loss of a unique riparian habitat. • Harvest of tributary forests may have contributed to downcutting and a decrease in riparian aquifer capacity. • Two species of nonnative grasses (buffel and Lehmann lovegrass) are filling in the open spaces of the Chihuahuan Desert and impacting thousands of acres changing the system. • Fire in Big Bend is an important natural disturbance and ecosystem driver for some park habitats and has occurred somewhere in the park every year from 1948 to 2014. The Chisos highlands forests have primarily been excluded from natural fire disturbances due to active fire suppression efforts since the beginning of the 20th century. • The park contains montane forests / sky island ecosystems with endemic or biologically unique organisms, which are physically separated from other similar ecosystems. • The montane forests are dominated by an oak-Arizona pine-cypress and piñon-talus forest community structure and have exhibited a declining trend in recent years, therefore, condition is of moderate concern. • Forty-five percent of the vegetation cover in the park is high desert shrubland. Shrubland habitats appear to be largely unfragmented. Grasslands are limited in extent, and their status and stability are largely unknown. • While ozone concentrations in the park are of moderate concern, the ozone sensitive plants in the park, including Goodding's willow and quaking aspen, are at relatively low risk as long as dry conditions prevail in the park (inhibiting ozone uptake by plants and resulting injury). • The relative lack of noise and artificial light contributes to the quality and diversity of ecosystems along the river corridor. • The Rio Grande is a vital refuge for migratory birds, including waterfowl, shorebirds, and songbirds such as warblers, vireos, and flycatchers.

Fundamental Resource or Value	Ecosystem and Biological Diversity
Current Conditions and Trends	**Conditions (continued)** • Elevated levels of mercury and airborne contaminants are a significant concern and have been documented in air, vegetation, birds, and fish. DDE and mercury were found in birds at levels possibly associated with impaired reproduction. Fish populations have also shown elevated levels of mercury. The relative importance from airborne mercury to local source is unknown. • Seventy-eight bird species are regularly found in the park along the Rio Grande and are considered "river obligates," and several are protected by federal or state governments. • The park has confirmed the presence of more than 450 species of birds (more than any other national park), 40% of which are migratory. • Mountain lions and black bears are present in the park in quantities believed to constitute stable populations. • The current population of desert bighorn sheep within the park is not stable or self-sustaining, which indicates high concern. • Over half of all bat species in the United States occur in the Big Bend area. • Over 40 species of fish are found in the park, eight are introduced, and the fish community is dominated by several minnow species. • Three state threatened reptiles exist in the park: Texas horned lizard, reticulate banded gecko, and the Trans-Pecos black-headed snake. • Nitrogen deposition warrants significant concern based on NPS Air Resources Division benchmarks. Park ecosystems may be very highly sensitive to nitrogen enrichment effects and current deposition levels are above the minimum ecosystem critical loads for some park vegetation communities, suggesting that lichen and herbaceous plants are at risk for harmful effects. • The Chisos Mountains represent the northernmost breeding range of the Colima warbler. • Big Bend gambusia (*Gambusia gaigei*), Rio Grande silvery minnow (*Hybognathus amarus*), and Texas hornshell mussel (*Popenaias popeii*) are the federally listed and candidate aquatic species in the park. • Mexican long-nosed bat (*Leptonycteris nivalis*) is the only federally listed mammal in the park. • The western subspecies of the yellow-billed cuckoo (*Coccyzus americanus occidentalis*) and the black-capped vireo (*Vireo atricapillus*) are two federally listed bird species found in the park. • Bunched cory cactus (*Coryphantha ramillosa* ssp. *Ramillosa*), Chisos hedgehog cactus (*Echinocereus chisoensis* var. *chisoensis*), Lloyd's mariposa cactus (*Sclerocactus mariposensis*), and Guadalupe fescue (*Festuca ligulata*) are the four federally listed and candidate plant species found in the park. **Trends** • Nonnative species are increasing. • Fire regime is outside of historic range of variability. High fuel loads are developing in the Chisos Mountains. Potential drivers of this change include: land use patterns, long-term climate trends, nitrogen deposition, fire suppression which have altered vegetation composition, and increasing temperatures and drying due to a move out of the last glacial period. • Over a 24-year period (1980–2003), the total number of fires increased nearly three-fold over the previous 34-year period (1946–1979), in part due to an increase in lightning and human-caused fires and in part due to a change in fire management policies. • From 2003 to 2012, the nitrogen deposition trend remained relatively unchanged. • Across all tree species and size classes, approximately 17% of trees living before a 2011 drought were dead in 2012. • The upstream portion of the river condition is degrading due to upstream river management, excess sediment load, etc. The lower reaches are not well understood.

Fundamental Resource or Value	Ecosystem and Biological Diversity
Current Conditions and Trends	**Trends (continued)** • Vegetation along the Rio Grande has changed dramatically over the last century, particularly after the construction of large dams upstream of the park. • Many of the park's floodplains and rocky canyons are now dominated by nonnative species such as salt cedar, giant cane, and Bermuda grass. • The salt cedar, a nonnative invasive tree, is declining due to biological control. • Increased effort to manage or reduce invasive species along the river. • Nonnative grasses are spreading, causing decline of biological diversity. • In some areas, especially on fragile, fine-textured soils, historic livestock grazing has impacted the desert grasslands, resulting in decreased grass cover, increased woody species, extensive erosion, and formation of arroyos. • Black bear sightings have increased within the park in recent years, although this doesn't necessarily indicate an increase in actual bear populations. • Desert bighorn sheep are again ranging into the Deadhorse Mountains of Big Bend. • Aquatic macroinvertebrates have seen a declining trend across all measures. • Several native fish species have been extirpated from the park and others have seen their natural ranges reduced. • Ozone concentrations increased during the last decade and are at levels known to cause injury to sensitive vegetation falling under the moderate concern category.
Threats and Opportunities	**Threats** • Nonnative invasive species present a significant challenge to the management and long-term preservation of the park's resources due to their far-reaching impact on the park's ecosystems. • Future of forest is uncertain due to climate change, changing fire regime, fuel loading, and the potential for disease or pest outbreaks. • Continued predator control outside park boundaries threatens viability of species within park boundaries. • Catastrophic wildfires could irreversibly change the sky island ecosystem. • Climate change and warming could impact aquifer characteristics, such as recharge and spring persistence, which would have an impact on ecological processes, visitor experience, and park management in general. • Increased water development outside park boundaries could decrease the nature and extent of spring resources. • Potential for regional population growth associated with energy and oil and gas development, which would increase pressure on limited water resources and would result in air pollution that could impact park ecosystems. • Climate change and potential for reduced biodiversity and increase in invasive species. • Projected increase in storm frequency / intensity for the region due to climate change could impact geomorphology and water quality of streams. • Occasional livestock trespass exacerbates erosion in fragile desert grasslands. • Selenium and mercury contamination has been identified as a threat to avian species in Texas in recent years. • Mountain lion populations may be at risk of reduced gene flow if agricultural development results in physical barriers into / out of the park. • The Mexican long-nosed bat roosting colony has experienced rangewide decline in Mexico, warranting significant concern within the park. • Fish species may continue to decline due to water quality, drought, decreased flow, channelization, impoundments, and the introduction of nonnative species. • Air pollution from factories in the United States and Mexico could negatively impact amphibian species in Big Bend due to their thin, permeable skin.

Fundamental Resource or Value	Ecosystem and Biological Diversity
Threats and Opportunities	**Threats (continued)** • Increased nitrogen deposition directly impacts native vegetation in the arid upland and grassland communities that are adapted to low nitrogen conditions. • Increase in ozone concentrations may lead to ozone injury in sensitive plants. • Potential loss of park specimens and associated field records due to lack of accountability (accessioning and cataloging). • An increase in light pollution or unnatural sounds (from development, air pollution, overflights, etc.) may result in substantial disruption to certain species. **Opportunities** • Partnership with public/private binational agencies and individuals. • Work cooperatively with other federal and state agencies and local stakeholders to reduce air quality impacts in parks from sources of air pollution such as oil and gas development. • Completion of the nonnative animals, exotic plants, and trespass livestock management plans. • Internal coordination with park staff regarding management actions. • Opportunities to work with Mexico on environmental flows and transboundary aquifer management. • Use prescribed fire as a management tool to reduce hazardous fuel loads, manage landscapes, and achieve ecological benefits. • Initiate and expand ecosystem restoration project (e.g., grasslands, riparian and aquatic habitat, Rio Grande hydrogeology). • Implement recovery plan for threatened and endangered species more fully.
Existing Data and Plans Related to the FRV	• Air quality monitoring in the park includes: ozone monitoring (NPS Gaseous Pollutant Monitoring Program), wet deposition monitoring of atmospheric pollutants, including nitrogen and sulfur (National Atmospheric Deposition Program – CASTNet), and visibility monitoring (Interagency Monitoring of Protected Visual Environments Program). • Exotic animals management plan (underway). • Exotic plants management plan (underway). • Trespass livestock management plan (underway).
Data and/or GIS Needs	• Air quality data (update). • Aquifer study – GIS layers for all water and related resources. • Black bear population monitoring strategy. • Catalog into the Interior Collections Management System (ICMS) all specimens (if existing) and associated field records resulting from studies and resource protection efforts. • Climate change vulnerability assessment. • Comprehensive channel and floodplain measurement and monitoring program. • Continued monitoring of the Mexican long-nosed bat in Emory Cave. • Exotic species monitoring data. • GIS data for all biological layers (update). • Historical ecological conditions research data. • Inventory and assessment of abandoned roads. • Parkwide count of mountain lions. • Repeat high-validity, multihabitat bird survey.

Fundamental Resource or Value	Ecosystem and Biological Diversity
Data and/or GIS Needs (continued)	• Special studies to examine pollution dose-response relationships in sensitive park ecosystems (i.e., plants, soils, wetlands), and assess the resilience of native ecosystems in the face of external perturbations. • Study of desert bighorn sheep densities and home ranges. • Study the potential ecological implications of the nonnative green tree frog on the endangered Big Bend gambusia. • Survey of earthworks (update). • Vegetation map (update).
Planning Needs	• Exotic species management plans (finalize). • Fire management plan (update). • Resource stewardship strategy. • Trail stewardship strategy. • Update the scope of collections statement to include collection of voucher specimens to document biodiversity and climate change.
Laws, Executive Orders, and Regulations That Apply to the FRV, and NPS Policy-level Guidance	**Laws, Executive Orders, and Regulations That Apply to the FRV** • Bald and Golden Eagle Protection Act • Clean Air Act • Clean Water Act • Endangered Species Act • Federal Cave Resources Protection Act • Federal Noxious Weed Act • Lacey Act • Migratory Bird Treaty Act • Museum Property Act • National Environmental Policy Act • National Invasive Species Act • Noise Control Act • Outdoor Recreation Act • Rivers and Harbors Appropriation Act • Wild and Scenic Rivers Act • Wilderness Act • Executive Order 11514, "Protection and Enhancement of Environmental Quality" • Executive Order 11988, "Floodplain Management" • Executive Order 13007, "Indian Sacred Sites" • Executive Order 13112, "Invasive Species" • Executive Order 13175, "Consultation and Coordination with Indian Tribal Governments" • "Resource Protection, Public Use, and Recreation" (36 CFR 2) • "Big Bend National Park" (36 CFR 7.41) • "Endangered and Threatened Wildlife and Plants" (50 CFR 17) • Secretarial Order 3289, "Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources" • Secretarial Order 3206, "American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act"

Fundamental Resource or Value	Ecosystem and Biological Diversity
Laws, Executive Orders, and Regulations That Apply to the FRV, and NPS Policy-level Guidance	**NPS Policy-level Guidance (NPS *Management Policies 2006* and Director's Orders)** • Director's Order 6: *Interpretation and Education* • Director's Order 18: *Wildland Fire Management* • NPS *Reference Manual 18: Wildland Fire Management* • *Interagency Burned Area Emergency Response Guidebook* • Director's Order 24: *Museum Collections Management* • Director's Order 25: *Land Protection* • Director's Order 32: *Cooperating Associations* • Director's Order 41: *Wilderness Stewardship* • NPS *Reference Manual 41: Wilderness Stewardship* • Director's Order 47: *Soundscape Preservation and Noise Management* • *NPS-75 Natural Resources Inventory and Monitoring Guideline* • NPS *Natural Resource Management Reference Manual 77* • Director's Order 77-1: *Wetland Protection* • *NPS Procedural Manual 77-1: Wetland Protection* • Director's Order 77-2: *Floodplain Management* • NPS *Procedural Manual 77-2: Floodplain Management* • Director's Order 77-7: *Integrated Pest Management* • Department of the Interior Policy on Consultation with Indian Tribes

Fundamental Resource or Value	International Cooperation and Regional Collaboration
Related Significance Statements	• Big Bend National Park, along with Rio Grande Wild and Scenic River, two Texas state parks, and four Mexican protected areas, comprise one of the largest transboundary protected areas in North America, covering 3 million acres and more than 300 miles of the Rio Grande. The binational character of this remote and diverse landscape figures high in visitor experience, as well as management opportunities and challenges.
Current Conditions and Trends	**Conditions** • Since the 1930s this process has been evolving and increasing. • In 1990, Los Diablos wildland fire crew was brought in to assist the fire management program. The crew consists of Mexican nationals who live in small communities immediately across the Rio Grande from the park. • Internationally recognized binational wildland fire agreement since 1990. • Insufficient staffing in wildland fire management program to work directly with Los Diablos wildland fire crew. • Closing port of entry in 2002 severely hampered efforts at binational management of resources, with significant steps forward taking place since the reopening of the historic crossing at Boquillas in 2013. • Some areas of resource management are easier than others (i.e., nonnative species vs. water flows). • Cross-training opportunities currently available for both sides (i.e., equipment and on-the-ground operations, as well as monitoring protocol and vital signs). • Sister parks have been implementing annual work plans associated with shared resources since 2013. • Southwest border resource protection program funded by NPS Intermountain Region office that allows project initiation along the border (i.e., provide funding); historically known as Mexican Affairs Office. • Park hired bilingual staff to improve international cooperation with counterparts and with local community members. • Insufficient staffing for binational management of water and biological resources. • Past and current perceptions that the border is unsafe and unstable in the Big Bend area hinder tourism. • Collaboration with private Mexican landowners to control livestock movement has been limited. In 2014 and 2015, sister park work plans identified activities to begin working with Mexican landowners on livestock issues. **Trends** • Mexican protected areas along the Big Bend reach of the Rio Grande have increased over the last few years with the addition of the Ocampo area and the Monumento Natural Río Bravo del Norte. • It is becoming more difficult to recruit younger Mexican firefighters because the border was closed between 2002 and 2013, limiting recruitment training and coordination opportunities with Los Diablos. New opportunities are now available to plan recruitment meetings and establish the next generation of Los Diablos. • Annual meetings with the National Commission for Natural Protected Areas of the Secretariat of the Environment and Natural Resources (Mexican federal agency that administers national protected natural areas) have been reestablished since 2013.

Fundamental Resource or Value	International Cooperation and Regional Collaboration
Threats and Opportunities	**Threats** • Commercial looting of historic sites. • With opening of the Boquillas Port of Entry inside the park, the Los Diablos wildland fire program has been required to update official identification documents on an annual basis, negatively impacting the effectiveness of the program to respond to park fire needs. • Emergency firefighting response times have dramatically slowed, which jeopardizes firefighting efforts. • Travel authorization to areas of Mexico beyond the river corridor is cumbersome and lengthy, which negatively impacts ability to collaborate on short-term and long-term projects with Mexican counterparts. **Opportunities** • Expand training opportunities for staff between sister parks. • Shared heritage education with local school systems and partners on both sides of the border. • Establish program that would alert the park on a variety of incidents. • Improve collaboration with the National Institute of Anthropology and History at state and national level to improve protection and knowledge base. • Continue to recruit staff that are bilingual and promote Spanish fluency with park staff to maintain collaboration with Mexico counterparts and community members. • The NPS Intermountain Region office has streamlined travel approval to Mexico for daily access to the river corridor and Boquillas. Additional work and collaboration with the US Department of State is needed to streamline travel to the interior of Mexico to work with Mexican counterparts. • Engage Mexico and other partners (state, federal, and nongovernmental organizations) on establishment of an adaptive environmental management program for the river. • Increase interdivisional cooperation with Mexican counterparts.
Existing Data and Plans Related to the FRV	• 2013, 2014, 2015 annual work plans with sister parks Maderas Del Carmen, Ocampo, and Cañon de Santa Elena. • *Protecting Biodiversity in the Chihuahuan Desert Transboundary Corridor: A Strategy for Binational Collaborative Management* (2002). • *Binational Study Regarding the Presence of Toxic Substance in the Rio Grande / Rio Bravo and Its Tributaries along the Boundary Portion between the United States and Mexico* (1994). • *Report on the Conference with Mexican Representatives Concerning the Proposed Big Bend* (1935).
Data and/or GIS Needs	• Establish common data standards and protocols between the park and Mexican partners. • Cross-border impacts report (update). • Ethnographic overview and assessment.
Planning Needs	• Exotic species management plans (finalize).

Fundamental Resource or Value	International Cooperation and Regional Collaboration
Laws, Executive Orders, and Regulations That Apply to the FRV, and NPS Policy-level Guidance	**Laws, Executive Orders, and Regulations That Apply to the FRV** • Clean Air Act • Clean Water Act • Endangered Species Act • Federal Noxious Weed Act • National Environmental Policy Act • National Invasive Species Act • Rivers and Harbors Appropriation Act • Wild and Scenic Rivers Act • Executive Order 11514, "Protection and Enhancement of Environmental Quality" • Executive Order 11988, "Floodplain Management" • Executive Order 13112, "Invasive Species" • Executive Order 13352, "Facilitation of Cooperative Conservation" • "Big Bend National Park" (36 CFR 7.41) • "Endangered and Threatened Wildlife and Plants" (50 CFR 17) • Secretarial Order 3289, "Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources" **NPS Policy-level Guidance (NPS *Management Policies 2006* and Director's Orders)** • Director's Order 18: *Wildland Fire Management* • NPS *Reference Manual 18: Wildland Fire Management* • Director's Order 32: *Cooperating Associations* • Director's Order 41: *Wilderness Stewardship* • NPS *Reference Manual 41: Wilderness Stewardship* • *NPS-75 Natural Resources Inventory and Monitoring Guideline* • NPS *Natural Resource Management Reference Manual 77* • Director's Order 77-1: *Wetland Protection* • NPS *Procedural Manual 77-1: Wetland Protection* • Director's Order 77-2: *Floodplain Management* • NPS *Procedural Manual 77-2: Floodplain Management* • Director's Order 77-7: *Integrated Pest Management*

Fundamental Resource or Value	Physical Resources
Related Significance Statements	• Big Bend National Park protects the largest and most representative example of the Chihuahuan Desert ecosystem in the United States, which includes the Chisos Mountains—the only mountain range fully contained within a US national park. The river, along with the springs, desert, mountain, and grassland environments, supports extraordinary biological diversity, including endemic and rare plants and animals. Big Bend National Park contains more species of birds, bats, butterflies, scorpions, ants, reptiles, and cacti than any other unit in the National Park Service. • Dramatic, diverse, and well-exposed geologic features provide opportunities to study a wide range of sedimentary, igneous, and metamorphic geologic processes in Big Bend National Park. The three great North American mountain-building episodes, which formed the Appalachians, Rockies, and Basin and Range, intersect in the Big Bend region. • The numerous scientifically important Cretaceous and Tertiary fossils found in Big Bend National Park record the evolution and history of ancient life from the Age of Reptiles through the Age of Mammals. The park preserves a largely intact 130-million-year slice of geologic time, including the dinosaur extinction event. • Big Bend National Park, along with Rio Grande Wild and Scenic River, two Texas state parks, and four Mexican protected areas, comprise one of the largest transboundary protected areas in North America, covering 3 million acres and more than 300 miles of the Rio Grande. The binational character of this remote and diverse landscape figures high in visitor experience, as well as management opportunities and challenges.
Current Conditions and Trends	**Conditions** • The Rio Grande Basin is one of the largest drainage areas in the United States, flowing east along the Mexican border and the southernmost boundary of Big Bend to the Gulf of Mexico. • The Rio Grande's flow regime is controlled primarily by the influence of the Rio Conchos in Mexico. • More than 300 water sources have been documented within the park. • The Rio Grande is an impaired water body and does not meet the standards for aquatic life use. Impaired parameters include total dissolved solids, sulfate, and chloride. • The weighted condition score for the hydrology / spring hydrology of the park is 1.00, indicating significant concern for both the quality and quantity of discharge. • Water quality parameters of total dissolved solids, fecal coliform, and macroinvertebrates (mussels) all indicate significant concern. • Erosion continually exposes fossils. • Across the park, soil texture, soil structure, organic matter content, and infiltration are of moderate concern. • Most soils are in good condition, but deep, fine texture soils at low elevation in the Tornillo Flat and North Rosillos Ranch areas are in poor condition and have not completely recovered from historic grazing practices and NPS restoration projects in the 1950s and 1960s. • The weighted condition score for all park soils is not known due to a lack of information on several measures, but is likely between moderate and high concern. • Geological and paleontological research is very active within the park. • The park has paleontological, geological, and soil collections in outside repositories. • Areas of NPS soil restoration that took place in the 1950s and 1960s are now eroding. • Inventory of park caves is currently underway. • Paleontological research at the park has been continuous and active since the 1930s. • The park contains fossils that are of great public interest, including giant crocodiles, numerous dinosaurs, and the largest known flying creature of all time—a pterosaur with a 35-foot wingspan.

Fundamental Resource or Value	Physical Resources
Current Conditions and Trends	**Trends** • Aquifers, groundwater, and surface waters are declining (Oak Springs is severely impacted by drought and pumping, as is the K-Bar aquifer). • Dams, water diversions, agricultural extraction, and domestic use of water resources in urban areas have reduced much of the Rio Grande's historic streamflow, modified flow regimes, reduced sediment transport, and increased water pollution in the past century. • Water availability across the park is strained due to climate change, increased temperatures, and aging infrastructure. • Water availability at Panther Junction and in the Chisos Basin is the product of a complex mix of water use, weather patterns, and climate change. The Panther Junction drinking water system has seen significant reductions in well water depth, requiring water conservation measures. The Chisos Basin drinking water system is dependent upon Oak Springs, which has shown significant reductions in flow during drought conditions. • Annual averages from 2000–2010 indicate that nitrate and sulfate concentrations in the park are decreasing slightly, based on data taken from air quality monitoring (from atmospheric wet deposition).
Threats and Opportunities	**Threats** • The primary hydrologic stressor of the Rio Grande in Big Bend is anthropogenic diversions and alterations within the Rio Grande Basin, particularly dam construction, increased water use, and agricultural and municipal return flows. • Temperatures are expected to increase in Texas (due to climate change), which will accelerate evapotranspiration, potentially causing even drier conditions. • Threats to the park's soils include erosion (particularly in grasslands), alterations to hydrologic patterns (e.g., roads, water diversions for historic ranching), legacy management activities (e.g., grassland restoration efforts in the 1950s and 1960s), atmospheric deposition of nutrients/pollutants, and climate change. • Emissions from coal-burning power plants and other industrial operations in eastern Texas, the Gulf Coast, other parts of the southern and eastern United States, and northeastern and central Mexico travel to the park on prevailing summer winds, reducing visibility and depositing nitrogen and sulfur. • Increase in mean annual temperature, storm frequency/intensity, and droughts projected for the region could degrade water quality (decrease dissolved oxygen, increase in temperature), reduce average stream flows, and increase episodic runoff events (increasing dissolved, suspended solid concentrations, and other water quality impacts along the Rio Grande and tributaries). • The park's springs are threatened by invasive species, recreational use, climate change, and increasing groundwater withdrawals. • Erosion continually exposes fossils, leading to looting of fossils, as well as minerals and rocks. • Vandalism in the form of graffiti and resource defacement. • Inadequate staffing to monitor air, water, soil resources. • Potential loss of park specimens and associated field records due to lack of accountability (accessioning and cataloging). **Opportunities** • Establish program that minimizes erosion (i.e., restore grasslands). • The replacement of aging and nonfunctioning well at K-Bar with new well field at Lone Mountain may reduce reliance on the K-Bar aquifer to supply water to Panther Junction. • Explore further how to efficiently use water resources. • Public education for resource protection.
Existing Data and Plans Related to the FRV	• *Geologic Resources Inventory Project for Big Bend National Park* (2011). • *Soil Survey of Big Bend National Park, Texas* (2011). • *Paleontological Resource Inventory and Monitoring: Chihuahuan Desert Network* (2007). • Please refer to appendix D for past planning and data collection efforts related to water resources.

Fundamental Resource or Value	Physical Resources
Data and/or GIS Needs	• Catalog into the Interior Collections Management System all specimens (if existing) and associated field records resulting from studies and resource protection efforts. • Channel narrowing and sedimentation data. • Climate change vulnerability assessment. • GIS of current park infrastructure (update). • Historical ecologic conditions research data. • Study of effects of nitrogen deposition. • Water use audit and ongoing tracking for all developed areas in park.
Planning Needs	• Adaptive environmental management plan for water and river. • Comprehensive / long-range interpretive plan (update). • Climate change scenario planning. • Drought contingency plan / 40-year water management plan / water use monitoring and conservation strategy. • Fire management plan (update). • Grasslands and tributaries / soil restoration plan. • Resource stewardship strategy. • Update the scope of collections statement to include collection of voucher specimens to document biodiversity and climate change.
Laws, Executive Orders, and Regulations That Apply to the FRV, and NPS Policy-level Guidance	**Laws, Executive Orders, and Regulations That Apply to the FRV** • Clean Air Act • Clean Water Act • Museum Property Act • National Environmental Policy Act • Federal Cave Resources Protection Act • Paleontological Resources Preservation Act • Wild and Scenic Rivers Act • Wilderness Act • Executive Order 11988, "Floodplain Management" • "Resource Protection, Public Use, and Recreation" (36 CFR 2) • Secretarial Order 3289, "Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources" **NPS Policy-level Guidance (NPS *Management Policies 2006* and Director's Orders)** • Director's Order 18: *Wildland Fire Management* • NPS *Reference Manual 18: Wildland Fire Management* • *Interagency Burned Area Emergency Response Guidebook* • Director's Order 24: *Museum Collections Management* • Director's Order 25: *Land Protection* • Director's Order 32: *Cooperating Associations* • Director's Order 41: *Wilderness Stewardship* • NPS *Reference Manual 41: Wilderness Stewardship* • NPS-75 *Natural Resources Inventory and Monitoring Guideline* • NPS *Natural Resource Management Reference Manual 77* • Director's Order 77-2: *Floodplain Management* • NPS *Procedural Manual 77-2: Floodplain Management*

Fundamental Resource or Value	Recreation and Education
Related Significance Statements	• With over 800,000 acres of protected land, Big Bend National Park provides exceptional opportunities to experience primitive desert wilderness, undisturbed natural soundscapes, solitude, world-class dark night skies, and unparalleled scenic vistas, extending into Mexico. Recreational and educational experiences include rare bird and wildlife viewing, river floating, international border crossing, hiking, sightseeing, and camping.
Current Conditions and Trends	**Conditions** • Backcountry drive-in campsites were lost in 2008 flooding. • Backcountry campsites are periodically closed due to drug trafficking. • Hiking trails along river corridor have been degraded due to trespass livestock, causing visitors to get lost. • Currently, the park has 300 miles of road, out of which 200 miles are backcountry. • Interpretive programming is declining. • Interpretive materials are moving toward digital distribution. • Interpretive waysides are in good condition. • School outreach remains steady. • Park is currently in the planning process for a future fossil exhibit. • Number of amphitheaters being actively used for interpretive programs is declining. • Historic and charismatic shade trees at Rio Grande Village and Cottonwood Campgrounds have declined. • There is a lack of museum exhibits for cultural resources. • Hiking trails and camping are not evenly distributed throughout the park. • There is parking congestion during busier visitation periods at Lost Mine Trail and Chisos Basin areas. • Decreasing river use due to lack of consistent water flow; commercial operators have had to adapt services to other revenue generating activities. • Boat ramps are in excellent condition. • NPS Route 16 (road to Santa Elena Canyon) regularly closed due to flooding and resulting sedimentation on roadway. • Trails are generally in good condition. • There is a new automated reservation system for backcountry reservations (visitor use data) as of 2013. The new system greatly simplifies analysis of visitor use trends. In 2013, the park recorded 203 permits for river use at Big Bend. • Port of entry at Boquillas reopened in 2013. • Approximately two dozen commercial use authorizations issued for a variety of recreational opportunities. • Big Bend National Park is of great interest to numerous scientific disciplines. • Ground-level ozone warrants moderate concern for human health based on NPS Air Resources Division benchmarks. **Trends** • Reduced backcountry camping use. • Increase in bird-watching over past few decades. • Increase in mountain biking in region and increasing interest in fat-tire biking. • From 2003 to 2012, ground-level ozone increased/deteriorated. • Declining stock use in park. • Declining fishing within park. • Increased number of waysides within park. • Recreational use is changing with park observing less overnight backcountry use. • Lower river flow in Santa Elena Canyon is impacting recreational opportunities. • Increased human waste at drive-in and hike-in backcountry campsites. • Increased technology use by visitors. • There have been improvements to park website. • One-third of historic shade trees at Rio Grande Village and Cottonwood Campgrounds have died since 2008. Rate of replacement has not kept up with mortality.

Fundamental Resource or Value	Recreation and Education
Threats and Opportunities	**Threats** • Trespass livestock damages trails and backcountry campsites. • Cross-border activity (real and perceived). • Declining water flow impacting recreation opportunities. • Increased human waste at drive-in backcountry campsites. • Projected increases in mean annual temperature, drought events, and storm frequency/intensity for the region due to climate change could impact visitor seasons and recreational activities. • At high concentrations, ozone (formed when nitrogen oxides from vehicles, power plants, and other combustion sources combine with volatile organic compounds from gasoline, solvents, and vegetation in the presence of sunlight) can aggravate respiratory and cardiovascular diseases; reduce lung function, cause acute respiratory problems, and increase susceptibility to respiratory infections. • Decreasing potable water could potentially affect concession contract viability. • Continual issue related to visitor underestimating effect of heat. • Chisos backcountry campsite sprawls due to possible decreased canopy. • Boundary issues with state park visitors and private resort visitors. • Loss of charismatic shade trees in campgrounds. **Opportunities** • Educational/interpretation opportunities at point of entry. • Outreach to public about benefits of reducing noise and light in a park environment as well as methods to reduce noise and light. • Educate public on leave no trace, especially as it relates to human waste. • Increase compost toilet use in backcountry. • Educate public on observed and projected impacts in the park due to a changing climate. • Expand interpretative and educational tools to communicate the connections between air quality/pollution, scenic views, night sky, sensitive park resources, human health, climate change, and other associated resources. • Create a preventive search and rescue program. • Coordinate with state parks to address visitor use conflicts and experiences. • Increase access to hiking and camping off paved roads. • Increase loop-trails throughout the park. • Increase opportunity to provide visitor "connectivity" (Wi-Fi, telephone, etc.). • Coordinate with an array of federal, state, and local agencies, including Mexican National Water Commission, on river flows. • Look for opportunities to better maintain river flows, which would also have a positive impact on the local economy, outfitters, and park visitors. • Improve park sustainability and environmental leadership by becoming a Climate Friendly Park and implement an operational park Environmental Management System (Director's Order 13A).
Existing Data and Plans Related to the FRV	• 1993–2000 backcountry camping study. • 1995 backcountry management plan. • Air quality monitoring in the park includes: ozone monitoring (NPS Gaseous Pollutant Monitoring Program), wet deposition monitoring of atmospheric pollutants, including nitrogen and sulfur (National Atmospheric Deposition Program – CASTNet), and visibility monitoring (Interagency Monitoring of Protected Visual Environments Program). • Annual visitor survey cards.

Fundamental Resource or Value	Recreation and Education
Data and/or GIS Needs	• GIS layers of recreational uses (update). • Survey of areas with human waste issues. • Search and rescue incident GIS mapping (historical data). • Visitor use patterns and trends; documenting public visitation and legal border crossing.
Planning Needs	• Backcountry and wilderness management plan (update). • Comprehensive / long-range interpretive plan (update). • Ecotourism / heritage tourism strategy and plan. • Preliminary safety analysis report. • Trail stewardship strategy. • Visitor use management plan.
Laws, Executive Orders, and Regulations That Apply to the FRV, and NPS Policy-level Guidance	**Laws, Executive Orders, and Regulations That Apply to the FRV** • Americans with Disabilities Act • Architectural Barriers Act • Clean Air Act • Federal Lands Recreation Enhancement Act • National Parks and Recreation Act • National Park Service Concessions Management Improvement Act • Outdoor Recreation Act • Wild and Scenic Rivers Act • Wilderness Act • Executive Order 11593, "Protection and Enhancement of the Cultural Environment" • Executive Order 11644, "Use of Off-road Vehicles on the Public Lands" • Executive Order 11988, "Floodplain Management" • Executive Order 11990, "Protection of Wetlands" • Executive Order 13123, "Greening the Government Through Efficient Energy Management" • Executive Order 13352, "Facilitation of Cooperative Conservation" • Executive Order 13514, "Federal Leadership in Environmental, Energy, and Economic Performance" • "Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities" (28 CFR 36) • "Resource Protection, Public Use, and Recreation" (36 CFR 2) • "Vehicles and Traffic Safety" (36 CFR 4) • "Commercial and Private Operations" (36 CFR 5) • "Big Bend National Park" (36 CFR 7.41) • "Curation of Federally-Owned and Administered Archeological Collections" (36 CFR 79) • "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act Accessibility Guidelines" (36 CFR 1191) • "Nondiscrimination in Federally Assisted Programs of the Department of the Interior" (43 CFR 17) Subpart B: "Nondiscrimination on the Basis of Handicap" • Secretarial Order 3289, "Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources"

Fundamental Resource or Value	Recreation and Education
Laws, Executive Orders, and Regulations That Apply to the FRV, and NPS Policy-level Guidance	**NPS Policy-level Guidance (NPS *Management Policies 2006* and Director's Orders)** • Director's Order 6: *Interpretation and Education* • Director's Order 7: *Volunteers in Parks* • Director's Order 13A: *Environmental Management Systems* • Director's Order 17: *National Park Service Tourism* • Director's Order 32: *Cooperating Associations* • Director's Order 41: *Wilderness Stewardship* • NPS *Reference Manual 41: Wilderness Stewardship* • Director's Order 42: *Accessibility for Visitors with Disabilities in National Park Service Programs and Services* • Director's Order 47: *Soundscape Preservation and Noise Management* • Director's Order 48A: *Concession Management* • Director's Order 52C: *Park Signs* • Director's Order 53: *Special Park Uses* • NPS *Reference Manual 53: Reference Manual Special Park Uses* • Director's Order 75A: *Civic Engagement and Public Involvement*

Analysis of Other Important Resources and Values

Other Important Resource or Value	Research and Partnerships
Related Significance Statements	• Big Bend National Park protects the largest and most representative example of the Chihuahuan Desert ecosystem in the United States, which includes the Chisos Mountains—the only mountain range fully contained within a US national park. The river, along with the springs, desert, mountain, and grassland environments, supports extraordinary biological diversity, including endemic and rare plants and animals. Big Bend National Park contains more species of birds, bats, butterflies, scorpions, ants, reptiles, and cacti than any other unit in the National Park Service. • Dramatic, diverse, and well-exposed geologic features provide opportunities to study a wide range of sedimentary, igneous, and metamorphic geologic processes in Big Bend National Park. The three great North American mountain-building episodes, which formed the Appalachians, Rockies, and Basin and Range, intersect in the Big Bend region. • The numerous scientifically important Cretaceous and Tertiary fossils found in Big Bend National Park record the evolution and history of ancient life from the Age of Reptiles through the Age of Mammals. The park preserves a largely intact 130-million-year slice of geologic time, including the dinosaur extinction event. • Big Bend National Park is the core of a greater region in which diverse cultures interacted over a span of more than 13,500 years. The park contains physical remains of human manipulation of the landscape and adaptation to post-Pleistocene climate change. The cultural history includes the long span of American Indian habitation and later contact with European settlers. More recent history includes the military, farmers, ranchers, miners, NPS development, and modern uses. • Big Bend National Park, along with Rio Grande Wild and Scenic River, two Texas state parks, and four Mexican protected areas, comprise one of the largest transboundary protected areas in North America, covering 3 million acres and more than 300 miles of the Rio Grande. The binational character of this remote and diverse landscape figures high in visitor experience, as well as management opportunities and challenges. • With over 800,000 acres of protected land, Big Bend National Park provides exceptional opportunities to experience primitive desert wilderness, undisturbed natural soundscapes, solitude, world-class dark night skies, clean clear air and unparalleled scenic vistas, extending into Mexico. Recreational and educational experiences include rare bird and wildlife viewing, river floating, international border crossing, hiking, sightseeing, and camping.
Current Conditions and Trends	**Conditions** • There is active research with multiple partners including Big Bend National Park, the NPS Chihuahuan Desert Inventory and Monitoring Network, US Geological Survey, US Fish and Wildlife Service, Chihuahuan Desert Research Institute, Center for Big Bend Studies, Sul Ross University, University of Texas, and other universities. • The Center for Big Bend Studies supports archeological and historical surveying and research within the park. • There are active cooperative ecosystem studies units for research in all fields. Academic researchers, energy and biotechnology industry conduct research at the park. • Many of the research products are held in the Science and Resource Management Library in Panther Junction. • Annually 40 to 80 research application permits are submitted for approval. • The park collaborates with multiple agencies on resource management, including Mexican counterparts and state and local governments. • US Customs and Border Protection provide funding for upkeep of backcountry roads and monitors for illegal activities associated with undocumented immigrants and drug trafficking. • The park has multiple partnerships that focus on resource preservation and restoration, including with the Commission for Environmental Cooperation, International Dark Sky Association, and World Wildlife Fund. • The friends organizations of the park, including Friends of Big Bend National Park and Big Bend Natural History Association, raise funds and advocate for the park to enhance visitor experiences and resource protection.

Other Important Resource or Value	Research and Partnerships
Current Conditions and Trends	**Conditions (continued)** • The park has multiple partnerships with local community groups, tourism councils, and outfitters group that promote park tourism. • Neighborly support with Terlingua for emergency services (Terlingua medic and fire department). • There is active public education and outreach with multiple partners. • The park has education and youth outreach program serving the San Vicente Independent School District, Big Bend High School, and public schools in Brewster County. • Concessioner (Forever Resorts) provides the park support, in terms of providing meals and services relating to special events, for a cost, but still supports with equipment and supplies, such as a stage, tables, and chairs. They host interpretive talks at their facilities and provide meeting space for some interpretive talks at the lodge. • Forever Resorts participates in the concessionaires "Dollar-per-Night" donation program, whereby an optional $1 is donated by visitors staying overnight to the interpretive services of the park. Forever Resorts assists by collecting this interpretive funding and passing it on to the cooperating association of the park. The park can then request the funds for interpretive use. • There is active collaboration with American Indian tribes in the region, including the Isleta del Sur Pueblo of Texas, Mescalero Apache of New Mexico, and the Comanche Nation of Oklahoma. A total of 16 tribes are consulted on activities associated with Big Bend National Park and the Rio Grande Wild and Scenic River. **Trends** • Friends group is getting larger and stronger and is advocating more for the park. • Main partners (concessioners) are growing. • Number of research permits is gradually increasing. • External and internal project funding is generally decreasing. • The unstable nature of staffing and limited staff time is also limiting the ability to oversee ongoing and potential research. • Relationship with Mexican partners is strengthening. • More supporting partnerships growing (tourism council, community groups). • More opportunities to partners in the last few years. • Accountability (accessioning and cataloging) for the results of active research continues to decline and no curator is available to perform these functions.
Threats and Opportunities	**Threats** • Funding challenges for important research. • Loss of continuity of research at park due to retirements, ebb and flow in interest. • Possible change of concessioners and possible need to have to rebuild relationships. • Potential loss of park specimens and associated field records due to lack of accountability (accessioning and cataloging).

Other Important Resource or Value	Research and Partnerships
Threats and Opportunities	**Opportunities** • Develop a research catalog and a list of NPS research needs to help focus research efforts to address park management needs. • Develop a partnership with the DOIs South Central Climate Science Center for climate change information that facilitates appropriate adaptation planning and management. • Follow oil and gas development (information and intelligence). • Identify partner interested in continuing threatened and endangered species monitoring. • Learn about new techniques to deal with invasive species (i.e., buffel grass). • Develop techniques to deal with invasive species (wildlife, livestock, plants). • Opportunity to grow funding for park from friends group. • Better management of river corridor through relationship building with Mexican partners. • With opening of the Boquillas Port of Entry, reestablish connections with Mexican researchers at universities in northern Mexico (action item in the 2014 and 2015 work plans with sister parks).
Existing Data and Plans Related to the OIRV	• Research Permit and Reporting System (RPRS) database keeps track of scientific studies previously conducted in the park. • Science and Resource Management Library in Panther Junction.
Data and/or GIS Needs	• Analyze data on the Research Permit and Reporting System (RPRS). • Catalog into the Interior Collections Management System all specimens (if existing) and associated field records resulting from studies and resource protection efforts. • Enter unaccesssioned reports into the Integrated Resource Management Applications. • Develop and populate a research catalog and list of research needs. • Visitor use, patterns, and trends; documenting public visitation and legal border crossing.
Planning Needs	• Park strategic plan for partnerships and research. • Resource stewardship strategy. • Update the scope of collections statement to include collection of voucher specimens to document biodiversity and climate change.
Laws, Executive Orders, and Regulations That Apply to the OIRV, and NPS Policy-level Guidance	**Laws, Executive Orders, and Regulations That Apply to the OIRV** • Museum Property Act • National Park Service Concessions Management Improvement Act • Native American Graves Protection and Repatriation Act • Executive Order 13352, "Facilitation of Cooperative Conservation" • Executive Order 13175, "Consultation and Coordination with Indian Tribal Governments" • "Commercial and Private Operations" (36 CFR 5) • Secretarial Order 3289, "Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources" **NPS Policy-level Guidance (NPS *Management Policies 2006* and Director's Orders)** • Director's Order 24: *Museums Collections Management* • Director's Order 32: *Cooperating Associations* • Director's Order 41: *Wilderness Stewardship* • NPS *Reference Manual 41: Wilderness Stewardship* • Director's Order 48A: *Concession Management* • Director's Order 53: *Special Park Uses* • NPS *Reference Manual 53: Reference Manual Special Park Uses* • Director's Order 75A: *Civic Engagement and Public Involvement* • Department of the Interior Policy on Consultation with Indian Tribes

Identification of Key Issues and Associated Planning and Data Needs

This section considers key issues to be addressed in planning and management and therefore takes a broader view over the primary focus of part 1. A key issue focuses on a question that is important for a park. Key issues often raise questions regarding park purpose and significance and fundamental and other important resources and values. For example, a key issue may pertain to the potential for a fundamental or other important resource or value in a park to be detrimentally affected by discretionary management decisions. A key issue may also address crucial questions that are not directly related to purpose and significance, but which still affect them indirectly. Usually, a key issue is one that a future planning effort or data collection needs to address and requires a decision by NPS managers.

The following are key issues for Big Bend National Park and the associated planning and data needs to address them:

- **Air Quality –** Big Bend National Park is a class I area under the Clean Air Act, meaning that it is afforded the greatest air quality protection. Visibility at Big Bend has improved very little in the past two decades, in contrast to most western national parks where visibility has improved. The scenic vistas that historically encompassed more than 150 miles are disappearing. Sulfur dioxide emissions from coal-fired, electricity-generating plants southeast of the park contribute to sulfate particles that impair visibility and also acid deposition that can damage natural and cultural resources in the park. In 2015, Environmental Protection Agency (EPA) proposed to require Texas coal-fired power plants to reduce sulfur dioxide emissions by 90%, which will improve visibility at Big Bend. Updated air quality data, a study that evaluates park impact on air quality, and an environmental management systems plan (update) would help in engaging and informing collaboration with outside partners in cooperative conservation that addresses air resource issues.

- **Border Issues –** Data that would bring awareness to change in patterns in development on both sides of the border, as well as data on illegal cross-border activity, would provide insightful information that would guide future planning efforts and management of the park. A blueprint document that guides the relationship with US Customs and Border Protection was identified as a management action related to this issue.

- **Boundary Issues –** Changes in ownership around Terlingua Ranch, Lajitas, and Chalk Draw Ranch have resulted in unresolved boundary issues that need to be addressed. While there are 801,163.21 acres within park boundaries, only 775,273.38 acres are in federal fee ownership. A boundary study was identified as an important data need that would address the unauthorized encroachment into park property.

- **Climate Change –** Mean annual temperature for the region is projected to increase 3.6°F to 4.7° F by 2050, with minimal change projected in mean annual precipitation. And increased storm frequency/intensity and droughts are also projected. Water and water-dependent ecosystems are scarce resources in the arid and semi-arid southwest and are generally regarded as biodiversity hotspots. It is anticipated that climate change will alter ground and surface water quantity, as well as seasonal patterns of availability, including flooding and drought. A drier landscape may increase the potential for wildland fire that could irreversibly convert the sky island ecosystem and threaten historic structures and/or cultural sites. These changes would in turn affect resource management, visitor use, and operations. A climate change scenario plan and an updated environmental management systems plan (update) would provide park management with tools for addressing and preparing for such changes. Interpretive effort could focus on the connection between greenhouse gas emissions and climate change impacts in the park.

- **Nonnative Species –** Many species of invasive nonnative plants and animals have become established throughout much of the park and threaten native species. In time, these aggressive nonnative plants and animals can greatly expand their populations, alter forest and wildlife habitats, and change scenery by smothering and displacing native species. These effects, which are already occurring in some areas of the park, will worsen substantially if left untreated. A sustained effort is needed to control these internal threats to the native species and their natural habitats. Completing the exotic species management plans, which would also address trespass livestock, was identified as an important planning need that would address this parkwide issue.

- **Historical Building Preservation –** Only 32 of 67 historic buildings within the park are listed in the Facility Management Software System (FMSS), and the park is behind in keeping up with maintenance. Condition assessment updates and historic buildings preservation plans were identified as data and planning needs that would address this issue.

- **Neighbor Relationships –** As park border communities develop and increase in Lajitas, Terlingua, Study Butte, and Boquillas, Mexico, additional opportunities and challenges will arise with management of visitor experience, viewshed protection, public access to trailheads, and tourism. An ecotourism/heritage tourism strategy plan was identified as an important planning need that would address this parkwide issue.

- **Maintenance of Current Development within the Park –** The park's aging infrastructure, including deteriorating water and wastewater systems, unimproved sections of road, and overcrowded campgrounds and parking lots, no longer are sufficient to support park operations and visitor use. In some cases, inadequate infrastructure threatens to degrade park resources. Overcrowding has extended to the administration and operations of the Panther Junction headquarters facility. Since the facility was constructed, the park staff has grown, increasing both office and storage needs. An environmental management systems plan (update) and a development concept plan / integrated park improvement and sustainability plan that holistically considers all these issues, including the inadequate amount of water for current use and development, were identified as important planning needs that would aid with this parkwide issue.

- **Water Quantity and Quality for Ecosystems –** The Big Bend reach of the Rio Grande does not meet aquatic use water quality standards and is on the list of impaired water bodies in Texas. Upstream diversions of the Rio Grande means that the relatively intact Chihuahuan Desert fish community in the Rio Grande is dependent on groundwater inputs from local and regional aquifers. The lack of an adaptive environmental management plan for the Big Bend reach is a significant issue

- **Water Quantity and Quality for Developed Areas –** Water sources at Chisos Basin and Panther Junction at times produce inadequate amounts of water for current development and use. Additionally, drinking water at some locations in the park is not in compliance with state standards. An environmental management systems plan (update) and a drought contingency plan / 40-year water management plan / water use monitoring and conservation strategy were identified as important planning needs related to this issue.

- **Wildland Fire Issues –** The hotter, drier, and longer fire seasons, coupled with dense build-up of vegetation, present a threat both from an ecological and a development stand. Developing a GIS model for the protection of archeological sites before fires occur was identified as a data need associated with this issue. An updated fire management plan that incorporates nonwildland-urban interface fuels and smoke management was identified as an important priority planning need that would help address and provide strategies to mitigate this issue along with the effective management of fuels in the Chisos highlands.

Planning and Data Needs

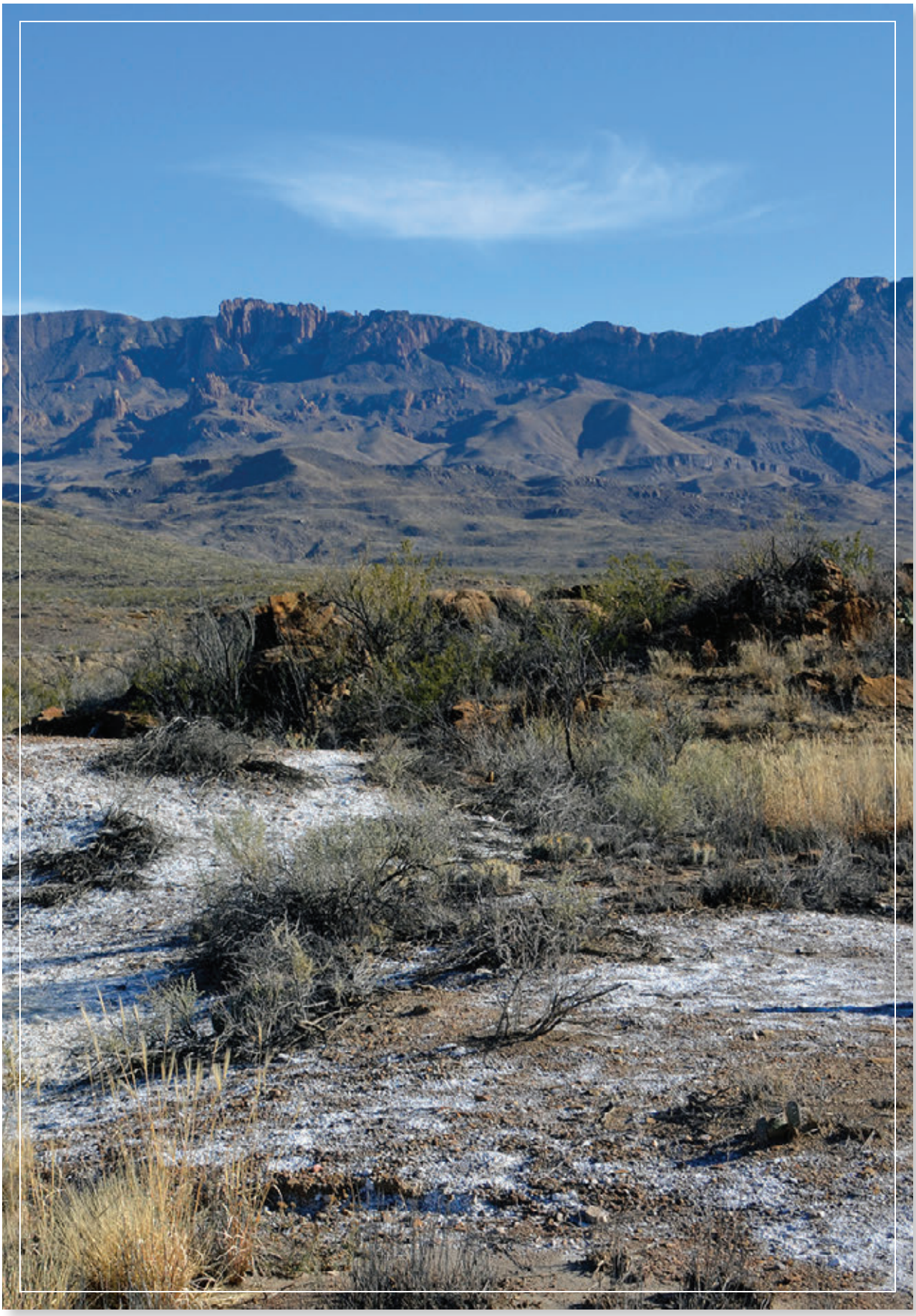
To maintain connection to the core elements of the foundation and the importance of these core foundation elements, the planning and data needs listed here are directly related to protecting fundamental resources and values, park significance, and park purpose, as well as addressing key issues. To successfully undertake a planning effort, information from sources such as inventories, studies, research activities, and analyses may be required to provide adequate knowledge of park resources and visitor information. Such information sources have been identified as data needs. Geospatial mapping tasks and products are included in data needs.

Items considered of the utmost importance were identified as high priority, and other items identified, but not rising to the level of high priority, were listed as either medium- or low-priority needs. These priorities inform park management efforts to secure funding and support for planning projects.

Planning Needs – Where A Decision-Making Process Is Needed			
Related to an FRV, OIRV, or Key Issue?	**Planning Needs**	**Priority (H, M, L)**	**Notes**
FRV	Backcountry and wilderness management plan (update)	H	Plan needed to adapt to modern uses and threats, changing visitor use patterns, and safety; last plan completed in1994; would support other planning efforts, carrying capacity.
FRV	Comprehensive / long-range interpretive plan (update)	H	An updated comprehensive interpretive plan is needed to account for the opening of the border with Boquillas, Mexico, and other changes that have occurred with social media and interpretive programming. Furthermore, an update to this plan is needed to address acoustic environment and scenic views more fully with park visitors. There is tremendous opportunity to use the park as a teaching tool for overarching regional and local night sky, acoustic, and air quality issues. Updated plan would integrate visitor education and interpretation into reduction of vandalism and other visitor-caused impacts/threats.
Key Parkwide Issue	Development concept plan / integrated park improvement and sustainability plan for Panther Junction and Chisos Basin areas	H	Plan is high priority as park is running out of water; there is aging infrastructure, limited capacity affecting park operations, visitor safety, and commercial services; difficulty repairing infrastructure without impacting resources; trying to adapt infrastructure to support existing visitor use; needs to be compatible with historic district; wildlife compatibility; fire/safety.
Key Parkwide Issue and FRV	Drought contingency plan / 40-year water management plan / water use monitoring and conservation strategy	H	Park has significant problems with water shortage/availability; would look at long-term sustainability, leverage current technology, and address both water supply and demand.
Key Parkwide Issue and FRV	Ecotourism / heritage tourism strategy and plan	H	Park focus on binational collaboration associated with ecotourism in the protected areas on both sides of the river; education, dark night skies, and garbage management components.
Key Parkwide Issue	Environmental management system (update)	H	This is a joint plan with Rio Grande Wild and Scenic River. Need help organizing and making it a real plan; green products, renewable energy, water use, and recycling would help with park operations.
Key Parkwide Issue and FRV	Exotic species management plans (finalize)	H	Plans are being finalized during 2015–2016, with focus on nonnative plants, livestock, and wildlife (barberry sheep, feral hog, nutria, bullfrog, green tree frog, red-eared slider, red imported fire ant, etc.).
Key Parkwide Issue and FRV	Fire management plan (update)	H	Plan needs updating so that it reflects current fire standard and staffing; ability to meet resource goals and objectives; would help inform fuel treatments in case funding becomes available; time sensitive as current plan is expiring. Updated plan would include fire management policies that protect air quality (i.e., smoke management).
FRV	Preliminary safety analysis report	H	Report would identify problem areas; planning for emergency response; visitor educational component; correct problem spots; would inform other management actions.

Planning Needs – Where A Decision-Making Process Is Needed			
Related to an FRV, OIRV, or Key Issue?	**Planning Needs**	**Priority (H, M, L)**	**Notes**
FRV and OIRV	Resource stewardship strategy (combined effort with Rio Grande Wild and Scenic River)	H	Plan would provide 20-year resource management strategy.
FRV	Trail stewardship strategy	H	Plan would address current infrastructure in place that adapts to current visitor use patterns; plan is currently being worked on; sets standards for sustainable maintenance and construction.
FRV	Adaptive environmental management plan for water and river (combined effort with Rio Grande Wild and Scenic River)	M	Plan would inform collaboration with multiple agencies on both sides to establish environmental flows in the river.
Key Parkwide Issue	Climate change scenario plan (combined effort with Rio Grande Wild and Scenic River)	M	Scenario planning would support resource stewardship strategy, protection programs, fire management plan, and water management plan.
FRV	Collection management plan (update)	M	Current plan was approved in 1994. Update is needed to account for new building and storage area, along with expansion of the collection. Plan would include strategy to increase museum collections storage space to curate items and records resulting from planned and previous research efforts. Effort would also establish repository agreements for long-term collection storage at nonfederal repositories as deemed necessary.
Key Parkwide Issue	Development concept plan for rest of park	M	Look at the Rio Grande Village, Chisos Basin, Route 16, Lone Mountain, Castolon, and irrigated campground areas.
FRV	Education and outreach plan	M	Plan would establish new priorities, including outreach to schools in Mexico.
Key Parkwide Issue and FRV	Historic buildings preservation plans	M	Almost 70 in the List of Classified Structures; plan would identify significant architectural features that should be preserved, detail specific treatment to correct structural deficiencies; legal mandate for List of Classified Structures; time sensitive as some buildings are already collapsing.
FRV	Plan for natural light and soundscape management	M	Includes zoning the park to indicate where outdoor lighting is required and where the naturally dark zone occurs. Sound impacts would also be identified within developed and backcountry areas.
FRV	Scenery conservation strategy	M	Using the visual resource inventory, the plan would identify protection strategies and collaboration efforts for protection of scenic views.
FRV	Cultural research scientific strategy	L	The final report on the parkwide archeological survey identifies a number of potential avenues for future research.

Planning Needs – Where A Decision-Making Process Is Needed			
Related to an FRV, OIRV, or Key Issue?	**Planning Needs**	**Priority (H, M, L)**	**Notes**
FRV	Grasslands and tributaries / soil restoration plan	L	Park has been implementing grassland restoration efforts for over 10 years. Recent work in 2014 on Terlingua Creek has proven effective. Additional planning is needed to analyze effectiveness of program and identify priorities for future restoration.
FRV	Monitoring plan for cultural sites	L	No plan currently exists for priority areas. Archeologist has conducted infrequent visits to high priority areas. More planning needed to identify how the Visitor and Resource Protection and the Science and Resource Management divisions within the park can collaborate to protect these resources.
OIRV	Park strategic plan for partnerships and research	L	Continue strengthening working relationships with the Friends of Big Bend National Park and Big Bend Natural History Association. Develop future collaborative actions with new or current partnerships that benefit resources, visitors, and the general public. Develop new research goals that focus on park priorities based on the assessment of current research permit and reporting system and review of recent research findings and outcomes.
FRV and OIRV	Update the scope of collections statement to include collection of voucher specimens to document biodiversity and climate change	L	The scope of collection statement defines the scope of present and future museum collection holdings of the park that contribute directly to the understanding and interpretation of the park's purpose, significance, and fundamental resources and values, as well as those objects that the National Park Service is legally mandated to preserve. It is designed to ensure that the museum collection is clearly relevant to the park. An updated statement would address the present and future museum collection needed to document biodiversity and climate change.
FRV	Visitor use management plan	L	Develop plan that includes Boquillas Port of Entry, increased visitation, and backcountry use.



Data Needs – Where Information Is Needed Before Decisions Can Be Made			
Related to an FRV, OIRV, or Key Issue?	**Data and GIS Needs**	**Priority (H, M, L)**	**Notes, Including Which Planning Need This Data Need Relates To**
FRV	Acoustic and night skies monitoring (increase frequency and sample locations)	H	Data needed to help in the preservation of night skies and acoustics; need information to guide management actions. Acoustic data would inform the establishment of baseline acoustic quiet zones.
Key Parkwide Issue	Boundary study	H	Study would prioritize problem areas needed as people start encroaching on the park boundary.
FRV	Channel narrowing and sedimentation data	H	Data would increase awareness of flooding along Route 16 and cultural resource impacts; visitor access issues and threat of invasive species; environmental flow efforts.
FRV	Climate change vulnerability assessment (combined effort with Rio Grande Wild and Scenic River)	H	This study would increase awareness of how changes in the physical environment will differentially alter the park's ecosystem.
FRV	Comprehensive channel and floodplain measurement and monitoring program	H	Environmental monitoring of river conditions; understand park developments and relationship with floodplain (Route 16, culverts, road alignments, backcountry campsites, river access, etc.).
Key Parkwide Issue and FRV	Data on changing patterns in development on both sides, including update of 1994 report on economic activities south of Big Bend (i.e., Carrera report)	H	Data would inform future planning; may impact management of park and visitor experiences; would focus efforts.
FRV	Establish common data standards and protocols between the park and Mexican partners	H	Supports cooperative resource management; identified in 2015 work plan between sister parks and associated with vital signs workshop planned for 2015.
FRV	GIS of current park infrastructure (update)	H	Data would inform park operations; water use monitoring and conservation plan; backcountry and wilderness management plan.
FRV	Lighting inventory (update)	H	Update parkwide inventory; could jeopardize night sky condition.
FRV	Oral histories	H	Need is time sensitive; would inform heritage tourism plan; interpretation, and education.
FRV	Visitor use patterns and trends; documenting public visitation and legal border crossing	H	Trail and campsite development; support visitor use management; changing demographics. Effort would include collecting data on the number of park visitors that cross the border. New permit system developed in 2013 (El Campo) tracks permits for camping and provides visitor use numbers per park location. Use at the Boquillas Port of Entry, visitor use at developed areas, and backcountry use are all questions to understand how visitors are now using the park. Determining needs is tracked from park surveys of visitors, comment forms, and assessment of potential trends in use.

Data Needs – Where Information Is Needed Before Decisions Can Be Made			
Related to an FRV, OIRV, or Key Issue?	**Data and GIS Needs**	**Priority (H, M, L)**	**Notes, Including Which Planning Need This Data Need Relates To**
FRV	Water use audit and ongoing tracking for all developed areas in park	H	Needed for 40-year water use plan; would help short- and long-term management; needed to inform future planning efforts and staffing.
Key Parkwide Issue and FRV	Air quality data (update)	M	Long-term dataset for the park; developments in oil and gas industry in the Permian Basin and northern Mexico pose new threats to air quality; national program funded by National Park Service and State of Texas. Information needed to understand the relative importance of petroleum development on air quality.
FRV	Aquifer study – GIS layers for all water and related resources	M	Determine extent of aquifers through use of GIS mapping software.
FRV	Archeological overview and assessment (revise)	M	Data would increase awareness of resources and would improve interpretive resources for public; would influence potential management actions.
FRV	Black bear population monitoring strategy	M	Develop scientifically valid monitoring strategy for future climate changes and reduced water availability; determine bear response to new environmental challenges.
FRV	Catalog into the Interior Collections Management System all specimens (if existing) and associated field records resulting from studies and resource protection efforts	M	Effort would access existing specimens and data that would inform scope of collections statement update and further identify park data gaps.
Key Parkwide Issue and FRV	Condition assessment of historic structures (annual updates)	M	Ongoing program that requires the development of five-year planning efforts for cyclical maintenance program and associated funding source; maintain historic buildings on the List of Classified Structures.
FRV	Continued monitoring of the Mexican long-nosed bat in Emory Cave	M	Important to develop deeper understanding of the Mexican long-nosed bat, an endangered species.
FRV	Continue to operate air quality station at K-Bar, Big Bend, to obtain daily, weekly, and annual data	M	Long-term monitoring program that is nationally funded has provided results on questions associated with regional and national pollution sources and continues to be significant program for this part of the Chihuahuan Desert.
Key Parkwide Issue	Cross-border impacts report (update)	M	Produce annual border protection report related to illegal livestock and undocumented alien activities.
FRV	Cultural GIS data (update)	M	Data would provide current conditions assessment; would protect resources during fire, flood, and extreme weather events.
FRV	Cultural landscape inventories	M	Preparation of cultural landscape inventories would identify landscape protection strategies for the Chisos Basin and other areas.

Data Needs – Where Information Is Needed Before Decisions Can Be Made			
Related to an FRV, OIRV, or Key Issue?	**Data and GIS Needs**	**Priority (H, M, L)**	**Notes, Including Which Planning Need This Data Need Relates To**
FRV	Data on oil and gas development in the region on both sides of the border and possible impacts on water resources	M	Develop understanding of where hydraulic fracturing or "fracking" is occurring; understand environmental detriments to air quality, possible seismic activity, water consumption, potential contamination, and potential for impacts on springs and decreased stream flows in the Rio Grande.
FRV	Digitize museum archival collections	M	Data would access data currently in paper files that are sitting in boxes and increase accessibility; would update comprehensive interpretive plan; at risk if left in current storage; research and education.
Key Parkwide Issue and FRV	Exotic species monitoring data	M	Data would support nonnative species management plan and resource stewardship strategy; would help understanding of significance of threat and influence priority of actions and funding.
FRV	Historical ecological conditions research data	M	Data would determine future desired conditions for resource stewardship strategy, environmental flows, adaptive management plan, fire management, and restoration projects. This would include information such as location data on historic riparian forests and pre-European condition of mid-elevation shrublands.
FRV	Parkwide count of mountain lions	M	Include death records and immigration/emigration data, as well as a genetic database. Research project is in progress during 2014–2015, Sul Ross State University, Texas.
FRV	Search and rescue incident GIS mapping (historical data)	M	Data would help with preventive measures; would guide trails stewardship strategies; would influence preventing planning and have visitor use implications.
FRV	Special studies to examine pollution dose-response relationships in sensitive park ecosystems (i.e., plants, soils, wetlands), and assess the resilience of native ecosystems in the face of external perturbations	M	This would be a combined effort with Rio Grande Wild and Scenic River. Study would help close knowledge gap that is important to address as park management programs are developed.
FRV	Study of effects of nitrogen deposition	M	Further research is needed to understand the impacts of too much nitrogen on the soils and plant communities in Big Bend National Park.
FRV	Study of desert bighorn sheep densities and home ranges	M	An exotic species wildlife management plan is being finalized in 2015, with focus on removal of barberry sheep. The removal of this nonnative will directly benefit bighorn sheep. Baseline is needed on bighorn sheep to understand status of this native species inside the park.
FRV	Survey of areas with human waste issues	M	Survey can be completed in-house; would support backcountry and wilderness management plan; would support changes in Superintendent's Compendium.

Data Needs – Where Information Is Needed Before Decisions Can Be Made			
Related to an FRV, OIRV, or Key Issue?	**Data and GIS Needs**	**Priority (H, M, L)**	**Notes, Including Which Planning Need This Data Need Relates To**
OIRV	Visitor survey and satisfaction data	M	Annual survey of visitor satisfaction is completed, with associated report showing park score.
FRV	Visual resource inventory (combined effort with Rio Grande Wild and Scenic River)	M	The visual resource inventory process would provide managers with a means for determining visual values. The baseline inventory consists of the evaluation of scenic quality, sensitivity analysis of public concern for scenic quality, and delineation of distance zones based on relative visibility from travel routes or observation points.
FRV	Wilderness character assessment	M	In 2015, the park will begin working on this data need. Results of the character study would assist in completing a new backcountry management plan.
OIRV	Analyze data on the Research Permit and Reporting System (RPRS)	L	The RPRS at the park is the tool for documenting and approving research permits. In 2013, there were 56 new research permits issued. During that same year, there was a total of 89 active permits. Would look at producing summary reports from RPRS, highlighting research results and data collected; update RPRS research goals for the park based on current needs.
FRV	Data on water source locations and condition	L	Data would support resource stewardship strategy, adaptive environmental management program (binational effort), and drought contingency plan / 40-year water management plan / water use monitoring and conservation strategy.
FRV	Data to establish baseline acoustic quiet zones	L	Lajitas airport expansion, increased overflights, increases in visitor use, and improved cell service has potential to affect acoustic quiet zones. A baseline could establish Big Bend as currently one of the quietest parks in the system.
OIRV	Develop and populate a research catalog and list of research needs	L	Continue to update research goals for the park; assess RPRS permit system; implement 2015 work plan goals with sister park staff, creating shared research catalog of active investigators in the region.
OIRV	Enter unaccesssioned reports into the Integrated Resource Management Applications (IRMA)	L	The Science and Resource Management Library at Panther Junction has referenced over 4,000+ reports in the web-based Integrated Resource Management Applications. Need continues to add hundreds of studies that are complete with findings published.
FRV	Economic valuation of ecosystem services	L	Promoted by economists, this new program to determine the economic value of ecosystem services would be important for the park when considering water quality and quantity in the Rio Grande, along with ecosystem services from the Chisos Highlands that produce drinking water for developed areas at Panther Junction and the basin.
FRV	Ethnographic overview and assessment	L	This overview and assessment would detail history and current practices of plant and other resource uses by traditionally associated tribes; interpretive and ethnographic resource protection planning are potential outcomes.

Data Needs – Where Information Is Needed Before Decisions Can Be Made			
Related to an FRV, OIRV, or Key Issue?	**Data and GIS Needs**	**Priority (H, M, L)**	**Notes, Including Which Planning Need This Data Need Relates To**
FRV	GIS data for all biological layers (update)	L	Developing GIS data for all biological layers would assist the fire program, visitor use planning, endangered species management, and compliance.
FRV	GIS layers of recreational uses (update)	L	Developing GIS data for recreational uses would improve park operations associated with infrastructure that supports recreational use (boat ramps, trails, zone camping, roads, etc.).
Key Parkwide Issue and FRV	GIS model for protection of archeological sites	L	Develop GIS model that would establish levels of protection for archeological sites based on distance from recreational developments, importance of the site, and current known threats.
FRV	Inventory and assessment of abandoned roads	L	Would assess roads for goal of removal and rehabilitation back to natural condition.
FRV	List of Classified Structures database (update)	L	Data would support the historic resource studies and historic preservation plans.
FRV	Repeat high-validity, multihabitat bird survey	L	Survey originally conducted by Gutzwiller and Barrow in 2001.
FRV	Study the potential ecological implications of the nonnative green tree frog on the endangered Big Bend gambusia	L	Increase awareness of the potential ecological implications of the nonnative green tree frog on the endangered Big Bend gambusia.
FRV	Survey of earthworks (update)	L	Survey would identify number and location of earthworks.
FRV	Survey remaining archeological sites, particularly riparian corridors	L	There is high density of significant sites along riparian corridors; data needed for general management planning and river recreation and use plans.
FRV	Vegetation map (update)	L	Especially needed for the vegetation of the lower Chisos.

Part 3: Contributors

Big Bend National Park and Rio Grande Wild and Scenic River

Cindy Ott-Jones, Superintendent
Tom Alex, Park Archeologist
Jeff Bennett, Park Physical Scientist/Hydrologist
Ken Bigley, Chief of Administration
Don Corrick, Park Geologist
David Elkowitz, Chief of Interpretation
Allen Etheridge, Chief Ranger
Dave Larson, Chief of Science and Resource Management
Natasha Moore, Park Ranger, Volunteer Coordinator
Linda Richards, Chief of Facilities Management
Heather Rickleff, Environmental Protection Specialist
Michael Ryan, River District Ranger
Joe Sirotnak, Park Botanist
Raymond Skiles, Park Wildlife Biologist
Bobbie Smith, Park Ranger – Boquillas Crossing Port of Entry
Ed Waldron, Park Fire Management Officer
Erik Walker, Park Trails Crew Supervisor

NPS Intermountain Region

Wendy Berhman, Planning Liaison
Darcee Killpack, Regional GIS Coordinator
Attila Bality, Rivers, Trails, and Conservation Assistance Program, Community Planner

NPS WASO, Park Planning and Special Studies

Pam Holtman, Foundation Quality Assurance/Quality Control Coordinator

NPS Denver Service Center - Planning

Tracy Atkins, Project Manager
Melody Bentfield, Contract Librarian
Tabitha Carver-Roberts, Contract Editor
Kelly Donahue, Project Specialist
Tatiana Márquez, Project Specialist
Wanda Gray Lafferty, Contract Editor
Laura Pernice, Geographic Information System Specialist
Nancy Shock, Foundation Coordinator
Alex Williams, Project Specialist
Angie Marie Wing, Contract Visual Information Specialist

Appendixes

Appendix A: Enabling Legislation and Legislative Acts for Big Bend National Park

[CHAPTER 281.]

AN ACT

To reserve eighty acres on the public domain for the use and benefit of the Kanosh Band of Indians in the State of Utah.

June 20, 1935.
[S. 380.]
[Public, No. 155.]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the west half southwest quarter section 10, township 23 south, range 5 west, Salt Lake meridian, Utah, be, and the same is hereby, reserved for the sole use and occupancy of the Kanosh Band of Indians of Utah: *Provided*, That the rights and claims of any bona fide settler initiated under the public-land laws prior to the approval hereof shall not be affected by this Act.

Public lands. Reserved for Kanosh Band of Indians, Utah.

Proviso. Rights of bona fide settlers not affected.

Approved, June 20, 1935.

[CHAPTER 282.]

AN ACT

Transferring certain national-forest lands to the Zuni Indian Reservation, New Mexico.

June 20, 1935.
[S. 1831.]
[Public, No. 156.]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the lands in townships 8 and 9 north, ranges 16 and 17 west, of the New Mexico principal meridian, New Mexico, comprising the Miller Division of the Cibola National Forest, are hereby eliminated from the Cibola National Forest and withdrawn as an addition to the Zuni Indian Reservation, subject to any valid existing rights of any persons thereto.

Zuni Indian Reservation, N. Mex. Designated forest lands transferred to.

Approved, June 20, 1935.

[CHAPTER 283.]

AN ACT

To provide for the establishment of the Big Bend National Park in the State of Texas, and for other purposes.

June 20, 1935.
[S. 2131.]
[Public, No. 157.]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That when title to such lands as may be determined by the Secretary of the Interior as necessary for recreational park purposes within the boundaries to be determined by him within the area of approximately one million five hundred thousand acres, in the counties of Brewster and Presidio, in the State of Texas, known as the "Big Bend" area, shall have been vested in the United States, such lands shall be, and are hereby, established, dedicated, and set apart as a public park for the benefit and enjoyment of the people and shall be known as the "Big Bend National Park": *Provided*, That the United States shall not purchase by appropriation of public moneys any land within the aforesaid area, but such lands shall be secured by the United States only by public and private donations.

Big Bend National Park, Tex. Establishment.

Area, location, etc.

Proviso. Lands secured by donation only.

SEC. 2. The Secretary of the Interior is hereby authorized, in his discretion and upon submission of evidence of title satisfactory to him, to accept, on behalf of the United States, title to the lands referred to in the previous section hereof as may be deemed by him necessary or desirable for national-park purposes: *Provided*, That no land for said park shall be accepted until exclusive jurisdiction over the entire area, in form satisfactory to the Secretary of the Interior, shall have been ceded by the State of Texas to the United States.

Acceptance of title.

Proviso. Exclusive jurisdiction required.

National Park Service to administer, etc.

Vol. 39, p. 535; U. S. C., p. 591.

Proviso.
Water Power Act not applicable.
Vol. 41, p. 1063; U. S. C., p. 694.

SEC. 3. The administration, protection, and development of the aforesaid park shall be exercised under the direction of the Secretary of the Interior by the National Park Service, subject to the provisions of the Act of August 25, 1916 (39 Stat. 535), entitled "An Act to establish a National Park Service, and for other purposes", as amended: *Provided*, That the provisions of the Act of June 10, 1920, known as the "Federal Water Power Act", shall not apply to this park.

Approved, June 20, 1935.

[CHAPTER 284.]

June 20, 1935.
[S. J. Res. 42.]
[Pub. Res., No. 34.]

JOINT RESOLUTION

To amend section 289 of the Criminal Code.

Criminal Code.
Vol. 35, p. 1145; Vol. 48, p. 152; U. S. C., p. 762.

Offenses committed in places under Federal jurisdiction.

Adoption of State laws to punish.

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That section 289 of the Criminal Code (U. S. C., title 18, sec. 468) be, and it is hereby, amended to read as follows:

"SEC. 289. Whoever, within the territorial limits of any State, organized Territory, or District, but within or upon any of the places now existing or hereafter reserved or acquired, described in section 272 of the Criminal Code (U. S. C., title 18, sec. 451), shall do or omit the doing of any act or thing which is not made penal by any laws of Congress, but which if committed or omitted within the jurisdiction of the State, Territory, or District in which such place is situated, by the laws thereof in force on April 1, 1935, and remaining in force at the time of the doing or omitting the doing of such act or thing, would be penal, shall be deemed guilty of a like offense and be subject to a like punishment.

Approved, June 20, 1935.

[CHAPTER 286.]

June 24, 1935.
[S. 1180.]
[Public, No. 158.]

AN ACT

To amend section 4865 of the Revised Statutes, as amended.

Columbia Institution for the Deaf, D. C.
Number of beneficiaries increased.
R. S., sec. 4865, p. 942; U. S. C., p. 991.
Vol. 40, p. 680.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the number of beneficiaries from the several States and Territories authorized by section 4865 of the Revised Statutes, as amended, for admission to the collegiate department of the Columbia Institution for the Deaf, be, and it hereby is, increased from one hundred and twenty-five to one hundred and forty-five.

Approved, June 24, 1935.

[CHAPTER 287.]

June 24, 1935.
[S. 2278.]
[Public, No. 159.]

AN ACT

Authorizing the construction of buildings for the United States Representative in the Philippine Islands.

Philippine Islands.
Buildings for United States Representative in, authorized.
Post, p. 595.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there is hereby authorized to be appropriated not to exceed $750,000 for the necessary housing for office and residence purposes for the establishment of the United States Representative in the Philippine Islands, including the acquisition of land, the purchase, construction, and reconstruction of buildings, and the procurement of furniture, furnishings, and equipment.

Approved, June 24, 1935.

Calendar No. 570

74TH CONGRESS, 1st Session | SENATE | REPORT No. 547

BIG BEND NATIONAL PARK

APRIL 15 (calendar day, APRIL 23), 1935.—Ordered to be printed

Mr. PITTMAN, from the Committee on Public Lands and Surveys, submitted the following

REPORT

[To accompany S. 2131]

The Committee on Public Lands and Surveys, having had under consideration by reference from the Senate the bill (S. 2131) to provide for the establishment of the Big Bend National Park in the State of Texas, and for other purposes, hereby reports the same favorably and recommends its passage.

The bill provides that when title to such lands as may be determined by the Secretary of the Interior as necessary for recreational park purposes within the boundaries to be determined by him within the area of approximately 1,500,000 acres in the counties of Brewster and Presidio, in the State of Texas, known as the "Big Bend area", shall have been vested in the United States, such lands shall be, and are hereby, established, dedicated, and set apart as a public park for the benefit and enjoyment of the people and shall be known as the "Big Bend National Park."

The bill provides that the land necessary for the purposes heretofore described shall be secured only by donations to the United States and not by appropriation from the Federal Treasury.

The bill authorizes the Secretary of the Interior in his discretion and on submission of evidence of title satisfactory to him to accept on behalf of the United States title to such lands within the area heretofore mentioned as may be deemed by him necessary or desirable for national park purposes.

The bill provides that no land for said park shall be accepted until exclusive jurisdiction over the entire area, in form satisfactory to the Secretary of the Interior, shall have been ceded by the State of Texas to the United States.

The bill further provides that the administration, protection, and development of the aforesaid park shall be exercised under the direction of the Secretary of the Interior by the National Park Service, subject to the provisions of the act of August 25, 1916 (39 Stat. 535),

entitled, "An act to establish a National Park Service, and for other purposes" and that the provisions of the act of June 10, 1920, known as the "Federal Water Power Act" shall not apply to the park.

The Big Bend region, within which the proposed park is to be located, is the triangular portion of southwest Texas enclosed by the big bend of the Rio Grande on the east, west, and south and roughly by latitude 30° on the north. It comprises approximately 5,500 square miles. In general character it is a semiarid plain, verging on desert, through which a group of mountain ranges, principally the Chisos, have been thrust. These constitute the southernmost spur of the Rocky Mountains. Of these, the Chisos Range "Phantom", the highest and most rugged, attaining an altitude of 7,835 feet, is literally a biological island.

The Big Bend area is the last great wilderness area of Texas. No railroad line transgresses its vastness. Its few roads are largely makeshift, leading in from the north, or improved wagon trails serving its few ranches and mining claims. The nearest thing to a town which exists are the two mining camps of Terlingua and Study Butte, some 25 miles west of the Chisos Range.

The reason for the long isolation of this area is its low economic value. Aside from the two quicksilver mines there has been no need for the arteries of trade, and the semiarid character of the plains surrounding the group of mountain ranges has offered little to agriculture save scattered areas for grazing.

The varied forest cover in the Chisos is still virgin. Large mammals, such as deer, bear, panther, and fox, still survive. The vegetation of the surrounding semiarid plains is principally a growth of chaparral and cactus. The forest cover in the higher levels of the Chisos, however, is extensively varied, with Douglas spruce, pine, junipers, oaks, and hackberry well represented.

The entire Big Bend region, comprising some three and a half million acres, would probably not be considered in its entirety as a national park area since the northern portion thereof consists principally of dry plains having no superlative features. To the south, however, the landscape is dominated by mountain ranges and is felt to be of high caliber to rank well as a national park. In the Chisos Mountains the visitor is agreeably surprised at the colorful rock expanses, rose-colored and tinged with faint greens and yellows.

One of the dramatic features in this area is the Rio Grande itself, which, in its tortuous course, cuts through three steep-walled canyons, the Santa Helena, the Mariscal, and the Boquillas, and meanders over flat river plains between.

The romance of old frontier Mexico is in the atmosphere of the Big Bend region. In the Chisos Mountains the visitor is continually aware of its presence. The outstanding views in three directions carry the eye over into the mountains of Old Mexico. From the south rim, over 5,000 feet above the river the eye obtains the most dramatic panorama of the Chisos—a 200-mile sweep of American and Mexican terrain. Below the Rio Grande winds through walled canyons and river flood plains. As a unit of the national park system the region would be unique in this international flavor.

The scenic standard of the Mexican side is apparently similar to that of the American. The aspects of a possible international park are highly intriguing. In fact it is contemplated that an effort will

be made to bring about the establishment of a park on the Mexican side of the Rio Grande immediately opposite the proposed park on the American side. The favorable report of the Department of the Interior on the pending measure is as follows:

DEPARTMENT OF THE INTERIOR,
Washington, D. C.

Hon. ROBERT F. WAGNER,
Chairman Committee on Public Lands and Surveys,
United States Senate.

MY DEAR MR. CHAIRMAN: I have received your letter of March 8 enclosing a copy of S. 2131, entitled "A bill to provide for the establishment of the Big Bend National Park in the State of Texas, and for other purposes", and requesting a report thereon.

This proposed legislation would authorize the establishment of the Big Bend National Park in the State of Texas, when the necessary lands shall have been secured by the United States by donation. The Big Bend area is a region of inspiring scenery, and contains many varieties of rare plant and animal life. It is of national importance, and worthy of Federal protection and development as a national park. The scenic grandeur of the Big Bend country extends across the border into Mexico, and it is hoped that, if this proposed legislation is enacted, the Mexican Government will be invited to cooperate with the United States in the establishment of an international park.

The Acting Director of the Bureau of the Budget has advised that, insofar as the financial program of the President is concerned, there is no objection to favorable action on this bill.

This bill is similar to H. R. 6373, upon which a separate report is being submitted to the Committee on the Public Lands of the House of Representatives. It is recommended that it be amended in the following particulars:

Page 1, line 5, eliminate the word "the."

Page 2, line 5, change the word "donations" to "donation."

I recommend that S. 2131, with amendments as indicated above, be enacted by the Congress.

Sincerely yours,

THEODORE A. WALTERS,
Acting Secretary of the Interior.

In reference to the proposal for a Mexican park in this vicinity on the Mexican side of the Rio Grande, the following correspondence will be found of interest:

UNITED STATES SENATE,
February 16, 1935.

MY DEAR MR. PRESIDENT: The proposal for a national park in the Big Bend section of Texas on the Rio Grande River has aroused general and favorable interest throughout Texas. It is one of the most magnificent and picturesque expressions of nature in the world. Inasmuch as the proposed park on the Texas side extends only to the middle of the Rio Grande River, which is the boundary between Texas and Mexico, it has occurred to me that it would be a splendid thing to take up with Mexico the matter of an international park in that section and to have Mexico establish a park on her side, which would adjoin the proposed park on the Texas side. Please have the matter properly investigated and considered.

Yours very sincerely,

MORRIS SHEPPARD.

On February 19 the above letter was referred by the President to the Secretaries of State and Interior with a request for a report.

DEPARTMENT OF STATE,
Washington, February 26, 1935.

Hon. HAROLD L. ICKES,
Secretary of the Interior.

MY DEAR MR. SECRETARY: I enclose herewith, for your consideration, a copy of a memorandum, dated February 19, 1935, from the President, addressed to the Secretary of State and the Secretary of the Interior, and a copy of its enclosure, a letter dated February 16, 1935, from the Honorable Morris Sheppard, United

States Senate, with reference to an international park project in the Big Bend section of Texas and the adjoining section of Mexico, and suggesting that the matter be taken up with Mexico. I also enclose a copy of a letter which I am today forwarding to the President with reference to the matter.

Sincerely yours,

WILLIAM PHILLIPS, *Acting Secretary.*

DEPARTMENT OF STATE,
Washington, February 26, 1935.

The PRESIDENT,
The White House.

MY DEAR MR. PRESIDENT: I have received your memorandum of February 19, 1935, addressed to the Secretary of State and the Secretary of the Interior, transmitting a copy of a letter dated February 16, 1935, from the Honorable Morris Sheppard, United States Senate, with reference to an international park project in the Big Bend section of Texas and the adjoining section in Mexico, and suggesting that the matter be taken up with Mexico.

Prior to the receipt of your memorandum the Department had received a communication from Senator Sheppard in regard to this project. I informed the Senator under date of February 23, 1935, that the Department will be glad to take up the matter with the Mexican Government, through Ambassador Daniels, at such time as there is definite assurance that the park on the Texas side of the Rio Grande will be created.

I am today sending copies of this letter, of your memorandum, and of its enclosure to the Secretary of the Interior for his consideration.

Faithfully yours,

WILLIAM PHILLIPS, *Acting Secretary.*

DEPARTMENT OF THE INTERIOR,
Washington, February 27, 1935.

The PRESIDENT,
The White House.

MY DEAR MR. PRESIDENT: I have received from the White House a copy of Senator Morris Sheppard's letter of February 16 to you, regarding the proposal to establish an international park along the Mexican border, and have noted your request for a report on this subject.

Under separate cover I am sending you a field report prepared by the National Park Service regarding this matter. The proposal involves lands in the Big Bend area in Texas, and in the adjoining provinces of Chihuahua and Coahuila in Mexico. I recently approved the recommendation of the National Park Service that the area referred to in Texas be established as the Big Bend National Park. Proposed legislation to provide authority for this action is now being drafted for submission to the Congress.

The possibility of an international park in this region meets with my approval and I recommend that, if the legislation is passed by Congress authorizing the establishment of a national park on the United States' side of the international boundary line, the Mexican Government be invited to cooperate with the United States in the establishment of such an international park.

Sincerely yours,

HAROLD L. ICKES,
Secretary of the Interior.

○

Appendix B: Traditionally Associated Tribes

Tribal Contacts

Absentee Shawnee Tribe of Oklahoma
2025 South Gordon Cooper Drive
Shawnee, OK 74801

Apache Tribe of Oklahoma
Apache Business Committee
PO Box 1330
Anadarko, OK 73005-1220

Comanche Nation, Oklahoma
Comanche Tribal Business Committee
PO Box 908
Lawton, OK 73502

Fort Sill Apache Tribe of Oklahoma
Fort Sill Apache Business Committee
Route 2, Box 121
Apache, OK 73006

Jicarilla Apache Nation, New Mexico
Jicarilla Apache Tribal Council
PO Box 507
Dulce, NM 87528

Kickapoo Traditional Tribe of Texas
HCR 1 Box 9700
Eagle Pass, TX 78852

Kiowa Indian Tribe of Oklahoma
Kiowa Business Committee
PO Box 369
Carnegie, OK 73015

Mescalero Apache Tribe of the Mescalero Reservation, New Mexico
Mescalero Apache Tribal Council
PO Box 227
Mescalero, NM 88340

San Carlos Apache Tribe of the San Carlos Reservation, Arizona
San Carlos Tribal Council
PO Box 0
San Carlos, AZ 85550

Shoshone Tribe of the Wind River Reservation, Wyoming
Eastern Shoshone Business Council
PO Box 538
Fort Washakie, WY 82514

Tonto Apache Tribe of Arizona
Tonto Apache Tribal Council
Tonto Reservation 30
Payson, AZ 85541

White Mountain Apache Tribe of the Fort Apache Reservation, Arizona
White Mountain Apache Tribal Council
PO Box 700
Whiteriver, AZ 85941

Ysleta Del Sur Pueblo of Texas
Ysleta Del Sur Pueblo Tribal Council
PO Box 17579
El Paso, TX 79917

Appendix C: Inventory of Special Mandates and Administrative Commitments

Special Mandates

- **Land Acquisition –** The Establishment Authorization Act of June 20, 1935, required that lands for the park be secured only by public and private donations. Subsequent acts of August 30, 1949 (63 Stat. 679), August 8, 1953 (67 Stat. 497), and December 28, 1980 (94 Stat. 3539), respectively, authorized the Secretary of the Interior to acquire lands in certain sections of Brewster County, Texas, and to procure the remaining nonfederal land and interests within the boundaries of Big Bend National Park. Approximately 24,000 acres of the southern Rosillos Mountains, encompassing the Pitcock-Rosillos Mountains Ranch, was authorized for addition to the park by an act of Congress on December 28, 1980 (94 Stat. 3539), yet funds for purchase were not appropriated. It remains a private inholding. The North Rosillos Ranch (Harte Ranch – 56, 719.65 acres) was added to the park by public law 100-201 on December 22, 1987.

- **Authority and Jurisdiction –** An act of the Texas legislature on May 12, 1939, authorized cession to the United States of partial exclusive jurisdiction over lands conveyed to the United States for Big Bend National Park. The State of Texas retained the right to execute all civil and criminal processes; to levy and collect taxes on sales of products; and to tax persons and corporations, and their franchises, and properties on land or lands deeded and conveyed to the United States under the terms of this act. The right of park residents to vote in state, county, and precinct elections is protected. The North Rosillos Subdistrict (Harte Ranch) is currently being managed under proprietary jurisdiction. An act of May 15, 1947 (61 Stat. 91), provided appointment and jurisdiction for a United States Magistrate for Big Bend National Park. This provides a means by which violations may be expeditiously processed on a local basis.

- **Wilderness Proposals –** A total of 533,900 acres of mostly roadless desert and mountain country were recommended to Congress for designation as wilderness. Another 27,000 acres were recommended as potential wilderness additions. Because the proposed wilderness addition was not acted upon by Congress, the areas proposed must be managed in a manner that will not preclude its suitability for wilderness designation in the future.

- **1976 UNESCO Designation –** Big Bend National Park is a UNESCO-designated Man and Biosphere Reserve, representing the Chihuahuan Desert.

- **1970 Clean Air Act -** Big Bend National Park is a designated mandatory class I air quality area under the federal Clean Air Act. Areas designated class I are granted special air quality protections, and it is the most stringent air quality classification protecting designated areas from air quality degradation.

- **Treaty of November 23, 1970 –** *Treaty to Resolve Pending Boundary Differences and Maintain the Rio Grande and Colorado River as the International Boundary* – resolved all pending boundary differences between the two countries and provided for maintaining the Rio Grande and the Colorado River as the international boundary. It provides procedures designed to avoid the loss or gain of territory by either country incident to future changes in the river.

- **Treaty of February 3, 1944 –** *Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande* – distributed the waters in the international segment of the Rio Grande from Fort Quitman, Texas, to the Gulf of Mexico. This treaty also authorized the two countries to construct, operate, and maintain dams on the main channel of the Rio Grande. The 1944 treaty also changed the name of the International Boundary Commission to the International Boundary and Water Commission, and in article 3, the two governments entrusted the International Boundary and Water Commission to give preferential attention to the solution of all border sanitation problems.

- **Convention of May 21, 1906 –** *Equitable Distribution of the Waters of the Rio Grande* – provides for the distribution between the United States and Mexico of the waters of the Rio Grande in the international reach of the river between the El Paso-Juárez Valley and Fort Quitman, Texas.
- **Convention of March 20, 1905 –** *Elimination of the Bancos in the Rio Grande from the Effects of Article II of the Treaty of November 12, 1884* – established the center of the normal channel of the rivers as the dividing line.
- **Convention of March 1, 1889 –** *Water Boundary* – established the International Boundary Commission to apply the rules in the 1884 Convention and was modified by the Banco Convention of March 20, 1905, to retain the Rio Grande and the Colorado River as the international boundary.
- **Convention of November 12, 1884 –** *Touching the International Boundary Line Where It Follows the Bed of the Rio Colorado* – established the rules for determining the location of the boundary when the meandering rivers transferred tracts of land from one bank of the river to the other.
- **Treaty of February 2, 1848 –** *Peace, Friendship, Limits, and Settlement (also known as the Treaty of Guadalupe Hidalgo)* – established the US-Mexico international boundary. The treaty of December 30, 1853, modified the boundary as it exists today.

Administrative Commitments

Title/Agency/ Organization	Purpose/Description	Expiration Date	Responsible Party
Commercial Use Authorization			
Concession Agreements with Forever Resorts	Operate facilities throughout the park: lodging units, restaurant, and store in the Chisos Basin; service station at Panther Junction; store, trailer hookups, gas station, laundromat, and showers at Rio Grande Village; and store and gas station at Castolon	2017	Chief of interpretation and partnerships
Various	Biking	(x1) permits Valid 1 year	Chief of interpretation and partnerships
Various	Bird-watching	(x4) Valid 1 year	Chief of interpretation and partnerships
Various	Ferry	(x1) Valid 1 year	Chief of interpretation and partnerships
Various	Hiking	(x10) Valid 1 year	Chief of interpretation and partnerships
Various	Overland tours	(x2) Valid 1 year	Chief of interpretation and partnerships
Various	Photography	(x2) Valid 1 year	Chief of interpretation and partnerships
Various	River tours	(x4) Valid 1 year (x4) Valid 2 years	Chief of interpretation and partnerships
Cooperating Association			
Big Bend Natural History Association	Cooperative relationship	10/31/2016	Chief of interpretation and partnerships
Cooperative Agreements			
Friends of Big Bend National Park	Provides legal and policy framework to encourage innovation and creativity to meet mutual goals	4/19/2021	Chief of interpretation and partnerships
Family Crisis Center and Local Counties	Sexual Assault Response Team	Indefinite	Chief ranger
Texas Department of Public Safety (TX DPS)	Use of TX DPS mobile frequencies	Indefinite	Chief ranger

Title/Agency/ Organization	Purpose/Description	Expiration Date	Responsible Party
General Agreements			
Big Bend National Park (BIBE) / Rio Grande Wild and Scenic River (RIGR) / Pecos County	Emergency medical services	3/2016	Chief ranger
BIBE / RIGR / Presidio County	Emergency medical services	3/2016	Chief ranger
BIBE / RIGR / Terrell County	Emergency medical services	3/2016	Chief ranger
US Department of the Interior (USDI), National Park Service (NPS), BIBE and San Vicente Independent School District	Operation of elementary school and land assignment	10/2016	Superintendent
BIBE / RIGR / Terlingua Fire	Emergency medical services	4/2017	Chief ranger
BIBE / RIGR / Brewster County	Emergency medical services	4/1/2019	Chief ranger
Interagency Agreements			
US Customs and Border Protection (USCBP) and BIBE	Road maintenance	9/30/2015	Chief of facility management
USDI, NPS, BIBE and USCBP	Los Diablos wildland fire crew	2/18/2019	Chief ranger
Candidate Conservation Agreement between BIBE, Guadalupe Mountains National Park, and USFWS Austin Ecological Services Field Office	Identify threats to candidate species, plan the measures needed to address the threats and conserve these species, identify willing landowners, develop agreements, and design and implement conservation measures and monitor their effectiveness		

Title/Agency/ Organization	Purpose/Description	Expiration Date	Responsible Party
Intergovernmental Agreements (continued)			
NPS, USDI and the Secretariat of Environment and Natural Resources (SEMARNAT) of the United Mexican States [This agreement supersedes the May 18, 2000, agreement between the SEMARNAT through its National Institute of Ecology and the NPS]	Creation of a framework for cooperation between the parties concerning: conservation of protected areas and their diversity; to the extent possible, the enjoyment of these areas by visitors; recognition of sustainable development alternatives for rural Mexican communities in those areas; and the exploration of strategies for related cooperation with rural communities, citizens groups, and scientific and other organizations of both countries accepted within the legal framework of each country	2017 with option to extent or amend (first signed Feb. 14, 2012)	
Joint Declaration of Sister Park Partnerships (Maderas del Carmen and Cañon de Santa Elena Flora and Fauna Protected Areas [MEX] and Big Bend National Park [USA])	Officially designates and recognizes "Sister Park" relationships and work as partners in national parks and natural protected areas with similar resources or mutual interests in a common set of management issues, for the purpose of furthering the cause of natural and cultural resources conservation and enjoyment	Indefinite (first signed March 23, 2006)	The National Commission for Natural Protected Areas of the Secretariat of the Environment and Natural Resources of the United Mexican States and NPS, USDI
Letter of Intent between the USDI and the Secretariat of Environment, Natural Resources, and Fisheries of the United Mexican States for Joint Work in Natural Protected Areas on the US-Mexico border	Plan to expand existing 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 US-Mexico border	Indefinite (first signed May 5, 1997)	
TX DPS and TX Law Enforcement Telecommunication System	Communications and information systems equipment	Indefinite	Chief ranger
Wildfire Prevention Agreement with Mexico	An agreement with Mexico on the prevention of wildfires		
Binational Strategic Planning with Sister Parks (Informal Event)	Annual planning event with Maderas del Carmen and Canyon de Santa Elena sister parks; first year initiated in 2013 with identified work plans established; planning events also completed during 2014 and 2015 with associated work plans	Indefinite – recurring on annual basis	Chief of science and resource management
Interpark Agreement			
BIBE / Fort Davis National Historic Site (FODA) / Amistad National Recreation Area (AMIS) / Palo Alto Battlefield National Historic Park	Fire management	3/26/2019	Chief ranger
BIBE / Sequoia and Kings Canyon National Parks	Visitor and resource protection split position	Until vacated	Chief ranger

Title/Agency/ Organization	Purpose/Description	Expiration Date	Responsible Party
License Agreement			
US Climate Reference Network	Meteorological station	Indefinite	Chief ranger
Memorandums of Agreement			
USDI and USCBP	Boquillas Crossing Port of Entry	12/31/2014	
USDI, US Forest Service, USCBP	Environmental coordination and review of border security	12/31/2017	
Big Bend Natural History Association (BBNHA) and BIBE	Recreational vehicle site construction	Upon completion	Superintendent
Memorandum of Understanding			
BIBE / AMIS / FODA / Sul Ross State University	Collection of specimens	9/26/2014	Superintendent
USDI Office of Aviation Services (OAS) and Texas Department of Public Safety (TX DPS)	Procedures and guidelines to use, to request, and provide aircraft support when conducting joint operations	6/30/2015	USDI, OAS
Texas Parks and Wildlife Department (TPWD), USDI NPS BIBE, USFWS Region 2, USGS Central Region – Texas Water Science Center, and USGS Biological Resources Division – Fort Collins Science Center	Promotion of collaborative working relationships to advance scientific basis for conservation actions and the effectiveness of their applications in the Big Bend region, to include Big Bend National Park; the Rio Grande Wild and Scenic River; Black Gap, Elephant Mountain, and Sierra Diablo Wildlife Management Areas; Balmorhea, Big Bend Ranch, Chinati Mountains, Davis Mountains, Franklin Mountains, Hueco Tanks, Monahans Sandhills, and Seminole Canyon State Parks; and the Devils River State Natural Area	10/2015	
NPS and TPWD	Cooperative management of national and state parks	7/11/2016	Intermountain Region
USDI NPS and the USFWS	Strengthen migratory bird conservation by identifying and implementing strategies intended to complement and support existing efforts, and facilitate new collaborative migratory bird conservation partnerships and comprehensive planning strategies for migratory birds	4/2020	Division chief of NPS Biological Resource Management and division chief of USFWS Migratory Bird Management
Cooperation for Wilderness Conservation between the NPS, USFWS, and US Bureau of Land Management; SEMARNAT through the National Commission for Natural Protected Areas of the United Mexican States; and the Parks Canada Agency of the Government of Canada	Creation of voluntary framework for cooperation and coordination among participants concerning the commemoration, conservation, and preservation of wilderness areas	Indefinite (first signed Nov. 7, 2009)	

Title/Agency/ Organization	Purpose/Description	Expiration Date	Responsible Party
Memorandum of Understanding (continued)			
National Parks Conservation Association	Management/use of National Parks Conservation Association parcel of land along RIGR	Indefinite	
Rio Grande Institute	Development of interpretational tourism	Indefinite	
USDI and Mexico Secretariat of Environment, Natural Resources and Fisheries	Declaration / letter of intent to work jointly in matters related to protection and conservation of the environment	Indefinite	
USDI, US Department of Homeland Security, and US Department of Agriculture	Cooperative national security and counterterrorism efforts	Indefinite	
USDI, US Border Patrol, and US Department of Justice	Aviation services for joint law enforcement	Indefinite	
Partnership Agreement			
International Mountain Biking Association and NPS	Establishes a formal framework for building on existing projects and expanding opportunities for mountain biking in national parks	2015	
Resource Education			
Forever Resorts and BBNHA	Donation contributions	12/31/2016	Chief of interpretation and partnerships
Right-of-Way			
Big Bend Telephone Company, Inc.	Operation and maintenance of telephone system lines		
Harte Ranch Road	BIBE ceded right-of-way		
Palomino Cell Road			
Rio Grande Electric Cooperative, Inc.	Operation and maintenance of electrical power distribution lines (also service contract)	3/19/2016	
Special Use Permits			
USDI BIBE / RIGR and US Postal Service	Operation of post office	12/31/2017	Superintendent
Special Use Permits (Filming, Spreading Ashes, Weddings)			Chief of interpretation and partnerships

Appendix D: Past and Ongoing Park Planning and Data Collection Efforts

Data Collection Efforts

2010 *Chihuahuan Desert Network Vital Signs Monitoring Plan*, Natural Resource Report, National Park Service / Chihuahuan Desert Network / NRR – 2010/188. National Park Service, Chihuahuan Desert Network, Genesis Building, New Mexico State University, Las Cruces, New Mexico, 88003.

- Knowing the condition of natural resources in national parks is fundamental to the ability of the National Park Service to manage park resources "unimpaired for the enjoyment of future generations." To more fully meet its mission, the National Park Service has implemented a strategy, funded by the Natural Resource Challenge, to programmatically institutionalize natural resource inventory and monitoring.

Integrated Resource Management Applications

As of November 4, 2014, Big Bend National Park has 4,220 entries (journal articles, published reports, unpublished reports, books, geospatial datasets, conference proceeding papers, aerial photographs, plans, notes, projects, dissertations, surveys, newsletter articles, vector datasets, and maps) that reference past and ongoing park planning and data collection efforts. Many of these resources are held in the Science and Resource Management Library, Panther Junction, Big Bend National Park, Texas.

- Park planning documentation in IRMA holds 209 references. Examples include 1988 and 1995 resource management plans and the 1968 *Historic Resources Management Plan, Big Bend National Park.*
- Documented monitoring efforts in the IRMA system currently identify 584 references. These references highlight the extensive research program at Big Bend and the continuing data collection efforts conducted by the Chihuahuan Desert Network, the National Park Service, sister federal agencies (e.g., USFWS, USGS, IBWC), universities, and others.
- References associated with data collection in the IRMA system for Big Bend shows 722 potential sources.
- In 2014, Big Bend National Park is taking collaborative steps to collect past and ongoing data from partner universities in Mexico and with Mexican sister parks.

Name	Type	Published
Assess Need for a Backcountry Cabin in Managing the Chisos Mountains Big Bend National Park Environmental Assessment	Planning	2014
Construct Fossil Discover Trail Exhibit Environmental Assessment	Planning	2014
Construct New Multi-Use Trail at Panther Junction Environmental Assessment	Planning [in process]	2006–2015
Fire Management Plan – Annual Update	Planning	2009–2014
Trails Stewardship Strategy	Planning [in process]	2015
Chisos Mountains Hazard Tree Assessment	Planning	2013
Boquillas Crossing Visitor Contact Station Environmental Assessment	Planning	2011
Trespass Livestock Management Plan Environmental Assessment	Planning [in process]	2011–2015
Chihuahuan Desert Network Vital Signs Monitoring Plan	Monitoring Plan	2010
Exotic Animals Management Plan Environmental Assessment	Planning [in process]	2010–2015
Exotic Plants Management Plan Environmental Assessment	Planning [in process]	2010–2015
Chisos Basin Wastewater Treatment Plan Replacement Environmental Assessment Big Bend National Park	Planning	2009
Christmas Mountains: Proposed Management Big Bend National Park	Planning	2008
Construct New Walking Trail at Dorgan-Sublett Farm Environmental Assessment / Assessment of Effect	Planning	2008
Introduction of Saltcedar Biological Control Agent Environmental Assessment	Planning	2008
Construct New Housing and Operations Facilities Environmental Assessment	Planning	2007
Emory Peak Trail Realignment Environmental Assessment	Planning	2007
Reestablishment of the Rio Grande Silvery Minnow into the Big Bend Stretch of Rio Grande Environmental Assessment	Planning	2007
Saltcedar Biological Control Environmental Assessment	Planning	2007
Treat Drinking Water – Rio Grande Village Environmental Assessment	Planning	2007
Develop New Drinking Water System – Rio Grande Village Environmental Assessment / Assessment of Effect Big Bend National Park	Planning	2006

Name	Type	Published
Comprehensive Interpretive Plan Big Bend National Park and Rio Grande Wild and Scenic River	Planning	2005
Endangered Big Bend Mosquitofish Habitat Enhancement Environmental Assessment	Planning	2005
Expansion of Panther Junction Visitor Center Environmental Assessment / Assessment of Effect	Planning	2005
Fire Management Plan Environmental Assessment Big Bend National Park	Planning	2005, 1994, 1980
Final General Management Plan / Environmental Impact Statement Big Bend National Park	Planning	2004
Solar Radio Repeater on Rosillos Peak Environmental Assessment	Planning	2004
Draft General Management Plan / Environmental Impact Statement Big Bend National Park	Planning	2003
Safety Improvements – Route 12, Mile 14 Environmental Assessment	Planning	2002
Rehabilitate the Castolon Water System Environmental Assessment Big Bend National Park	Planning	2001
Collection of Large Dinosaur Fossil Environmental Assessment	Planning	2000
Hazard Tree Management Plan: Big Bend National Park	Planning	1999
Aviation Management Plan	Planning	1998
Big Bend National Park Business Plan	Planning	1998
Long-Range Interpretive Plan: Castolon Historic District Big Bend National Park	Planning	1997
Recreational River Use Management Plan Big Bend National Park	Planning	1997
Strategic Plan: Big Bend National Park, Rio Grande Wild and Scenic River **Restricted Access**	Planning	1997
Water Resources Management Plan	Planning	1996
Strategic Plan: Big Bend National Park **Restricted Access**	Planning	1996
Water Resources Management Plan	Planning	1996
Big Bend National Park Backcountry Management Plan	Planning	1995
Resource Management Plan for Big Bend National Park	Planning	1995
Collection Management Plan Big Bend National Park **Sensitive Access**	Planning	1994
Mexican Long-Nosed Bat Recovery Plan	Planning	1994

Name	Type	Published
Strategic Plan for the US Biosphere Reserve Program	Planning	1994
Big Bend Housing Management Plan	Planning	1992
Planning and Response to Mountain Lion Incidents	Planning	1991
Resources Management Plan for Big Bend National Park	Planning	1988
Finding of No Significant Impact: Draft Development Concept Plan Environmental Assessment, Santa Elena Canyon Area	Planning	1986
Land Protection Plan Big Bend National Park	Planning	1986
Backcountry Management Plan	Planning	1985
Development Concept Plan, Santa Elena Canyon	Planning	1985
Road Classification Plan Big Bend	Planning	1984
Natural Resources Management Plan for Big Bend National Park (revised)	Planning	1982
Resource Management Plan for Big Bend	Planning	1982
General Management Plan: Master Plan Big Bend National Park **Restricted Access**	Planning	1981
Natural Resources Management Plan	Planning	1981
Backcountry and River Management Plan	Planning	1980
Development Concept Plan Panther Junction	Planning	1979
Environmental Assessment Development Concept Plan Castolon	Planning	1979
Environmental Assessment Development Concept Plan Rio Grande Village	Planning	1978
High Chisos Campsite Study	Planning	1978
Environmental Assessment Development Concept Plan for Panther Junction	Planning	1977
Habitat Management Plan for Big Bend Gambusia	Planning	1977
Resources Management Plan for Big Bend National Park	Planning	1977
Development Concept Plan for the Chisos Basin	Planning	1975
Final Environmental Statement Proposed Wilderness Classification Big Bend National Park	Planning	1975
Environmental Assessment for the Chisos Basin Development Concept	Planning	1974
Wilderness Recommendation: Big Bend National Park **Restricted Access**	Planning	1974
Backcountry Management Plan: Big Bend National Park **Restricted Access**	Planning	1973
Master Plan, Big Bend	Planning	1973
Big Bend Master Plan	Planning	1971
Historic Resources Management Plan	Planning	1968
Big Bend Natural Sciences Research Plan	Planning	1967
Natural Science Research Plan	Planning	1951

Name	Type	Published
Air		
Air Quality Monitoring Protocol and Standard Operating Procedures for the Sonoran Desert, Southern Plains, and Chihuahuan Desert Networks	Monitoring Protocol	2011
Assessment of nitrogen deposition effects and empirical critical loads of nitrogen for ecoregions of the United States. Gen. Tech	Data	2011
Evaluation of the Sensitivity of Inventory and Monitoring National Parks to Acidification Effects from Atmospheric Sulfur and Nitrogen Deposition: Chihuahuan Desert Network	Data	2011
Evaluation of the Sensitivity of Inventory and Monitoring National Parks to Acidification Effects from Atmospheric Sulfur and Nitrogen Deposition: Main Report	Data	2011
Evaluation of the Sensitivity of Inventory and Monitoring National Parks to Nutrient Enrichment Effects from Atmospheric Nitrogen Deposition: Chihuahuan Desert Network (CHDN)	Data	2011
Evaluation of the Sensitivity of Inventory and Monitoring National Parks to Nutrient Enrichment Effects from Atmospheric Nitrogen Deposition: Main Report	Data	2011
Impacts of atmospheric nitrogen deposition and climate change on desert ecosystems. Big Bend National Park: Final Report	Data	2006
Big Bend Regional Aerosol and Visibility Observational Study Final Report	Data	2004
Ozone risk assessment for Chihuahuan Desert Network	Data	2004
Preliminary Review of Prescribed Burning Smoke Management Planning for Big Bend National Park	Data	1991
Introduction to Visibility	Data	1999
Biota		
Landbird Monitoring in the Chihuahuan Desert Network, Annual Report(s) (2013, 2012, 2011, 2010)	Data	2014, 2013, 2012, 2011
Landbird Monitoring Protocol and Standard Operating Procedures for the Chihuahuan Desert, Northern Great Plains, Sonoran Desert, and Southern Plains Networks, Version 1.00	Monitoring Protocol	2013
Assemblages of Rodents in Riparian Forests along the Rio Grande in Big Bend National Park Current and Historic Insights on the Effects of Invasion by the Salt Cedars	Data	2012
Chihuahuan Desert National Parks Reptile and Amphibian Inventory	Data	2011
Mammals of the Rio Grande Wild and Scenic River Downstream of Big Bend National Park, 2008 Final Report	Data	2011
A Study of the Growth, Reproduction, and Morality of *Echinomastus mariposensis* (Cactaceae) in Big Bend National Park, Texas	Data	2010
Baseline Assessment of Butterfly Diversity in Saltcedar Biocontrol Release Area **Restricted Access**	Data	2010
Baseline Assessment of Small Mammal Diversity in Saltcedar Biocontrol Release Area Big Bend National Park Final Report: Fall 2009 and Spring 2010 **Restricted Access**	Data	2010
Chihuahuan Desert Network Park Monitoring Brief Natural Resource Monitoring at Big Bend National Park and Rio Grande Wild and Scenic River	Data	2010
Report on Butterfly Surveys on Santa Elena Canyon Floodplain **Restricted Access**	Data	2010
Determining the Baseline Status of Black-Capped Vireos in Texas	Data	2009

Name	Type	Published
Biota (continued)		
Riparian Bird Population Monitoring at Saltcedar Biological Control Sites Big Bend National Park	Data	2009
Mesocarnivore Richness and Relative Distribution along Riparian Areas of Big Bend National Park	Data	2008
Evaluation of Hybridization and Introgression of *Trachemys gaigeae* and *Trachemys scripta* in Big Bend National Park	Data	2007
Agave survey 1986–2006	Data	2006
Botanical Resource Survey – Proposed Emory Peak Trail Re-Route Big Bend National Park	Data	2006
Entomological Research – Big Bend, Texas	Data	2006
Floristic Inventory of Proposed Mountain Bike Trail in Big Bend National Park, Texas: Survey 1 – Late Summer / Rainy Season	Data	2006
Peregrine Monitoring Field Data, Big Bend National Park and Rio Grande Wild and Scenic River	Data	2006
Selected Bibliography and Species List for Herpetofauna, Rio Grande Wild and Scenic River	Data	2006
Baseline Inventory of Amphibians in the Maderas del Carmen and Canon de Santa Elena Protected Areas, Mexico, and Big Bend National Park, Texas, USA, at the Beginning of the 21st Century	Data	2005
Colima Warbler Census – 2005 Report	Data	2005
Status of Fish Communities in the Rio Grande, Big Bend National Park, Texas	Data	2005
Winter Ecology of American Black Bears in a Desert Montane Island	Data	2005
Prescribed Fires and Black-Capped Vireos in Big Bend National Park	Data	2004
Survey[s] of the Status of the Black-Capped Vireo in Big Bend National Park, Brewster County, Texas	Data	2004, 1997, 1996, 1992
Monitoring Results of American Peregrine Falcons (report titles vary slightly year by year)	Data	2003, 1997, 1994, 1992, 1990, 1989, 1988, 1985, 1975
Fishes of Big Bend National Park and the Rio Grande Wild and Scenic River Big Bend National Park **Restricted Access**	Data	2003
Mountain Lion Incidents in Big Bend National Park, 1953–2003	Data	2003
Performance Report as Required by State Wildlife Grants Program. Texas Federal Aid Grant No. T-1, Wildlife Diversity Science: Mountain Lion Status	Data	2003
Amendment to the Full Study Plan for Vertebrate and Vascular Plant Inventory of the Chihuahuan Desert Network	Data	2002
Baseline Assessment of Instream and Riparian-Zone Biological Resources on the Rio Grande in and Near Big Bend National Park	Data	2002
Environmental contaminants in prey and tissues of the peregrine falcon in the Big Bend Region, Texas	Data	2002
Characterization of the Habitat of the Beaver (*Castor canadensis mexicanus*) along a Stretch of the Rio Bravo in the Santa Elena Canyon Flora and Fauna Protection Area, Chihuahua	Data	2001

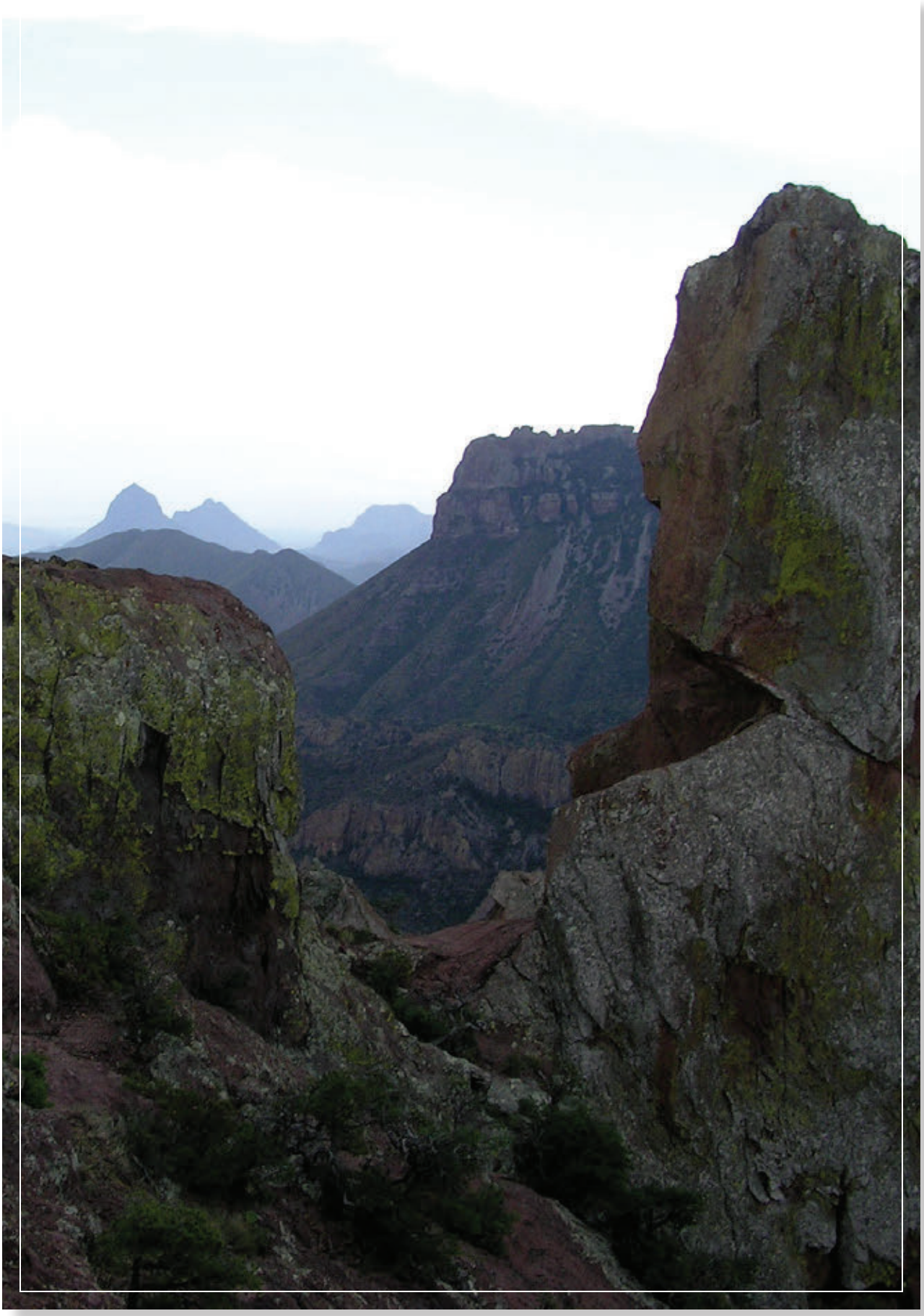
Name	Type	Published
Biota (continued)		
Status of American Peregrine Falcons in Big Bend National Park and the Rio Grande Wild and Scenic River	Data	2001, 2000
Winter Ecology and Food Habits of Black Bears in Big Bend National Park	Data	2001
Report on Colima Warbler Census(es)	Data	2000, 1996, 1986, 1985, 1984, 1982, 1971, 1970, 1969, 1968, 1967
Rare Plant and Animal Species on National Park Service Lands in Texas	Data	1998
Report on 1996 Colima Warbler Census and Assessment	Data	1996
The Rare and Threatened Plant Species of the Big Bend National Park, Texas	Data	1996
Food Habits of the Mexican Black Bear in Big Bend National Park, Texas, and the Serranias del Burro, Coahuila, Mexico 1991–1994	Data	1995
A Closer Look: Colima Warbler	Data	1994
List of Fishes Found in the Rio Grande and Tributary Streams in the Big Bend of Texas	Data	1993
Range and Habitat of the Colima Warbler	Data	1990
Status and Distribution of the Black Bear in Big Bend	Data	1990
Influence of Large Herbivores on Chihuahuan Desert Vegetation	Data	1988
Comparative Desiccation Tolerance of Three Desert Pteridophytes: Response to Long-Term Desiccation	Data	1987
Distribution of the Chihuahuan Desert Herpetofauna and Its Relation to the Climate	Data	1982
Ecology and Social Behavior of the Collared Peccary in Big Bend National Park	Data	1982
Ecology of the Carmen Mountains White-Tailed Deer	Data	1981
Colima Warbler Status at Big Bend National Park, Texas	Data	1979
An Evaluation of Essential Habitat of Nesting Peregrine Falcons at Santa Elena Canyon, Big Bend National Park, Texas	Data	1978
Ecology of the Carmen Mountains White-Tailed Deer – Taxonomy and Distribution of Carmen Mountain White-Tailed Deer (*Odocoileus virginianus carminis*) – Forage Relationships between Two Deer Species in Big Bend National Park	Data [Dissertation]	1976
Ethological Study of *Vermivora crissalis* in the Chisos Mountains, Texas	Data [Thesis]	1973
The Ecology, Morphology, and Distribution of *Hechtia scariosa* in the Big Bend National Park, Including a Brief History of the Area	Data	1973
Colima Warbler Density and Distribution in the Chisos Mountains, Texas	Data	1971, 1970
New Records of Warblers in Texas	Data	1967
Winter and Early Spring Birds in Big Bend	Data	1967
Preliminary Ecological Survey of the Northern Sierra Del Carmen, Coahuila, Mexico, April 1–10, 1945	Data	1945
The Discovery of the Nest of the Colima Warbler (*Vermivora crissalis*)	Data	1936

Name	Type	Published
Climate and Weather		
Enhanced Monitoring to Better Address Rapid Climate Change in Southwest Desert Parks: A Multi-Network Strategy	Monitoring Strategy	2011
Weather and Climate Inventory, National Park Service: Chihuahuan Desert Network	Data	2007
Cultural Resources		
Big Bend National Park: History and Archeology	Data	2008
Intermountain Region New Deal Resources Research Findings for Big Bend National Park	Data	2008
Landscape of Ghosts, River of Dreams: A History of Big Bend National Park	Data	2002
Castolon Historic Structures Report Amendment Big Bend National Park **Restricted Access**	Data	2000
Presidios of the Big Bend Area	Data	1990
Archeological Survey of the Chisos Basin Trail Reconstruction Project **Archeology Access**	Data	1989
The Big Bend: A History of the Last Texas Frontier	Data	1975
Hot Springs, Big Bend National Park: Historic Structures Report, Part I, Historical Data	Data	1968
Longhorns of the Big Bend: A Special Report on the Early Cattle Industry of the Big Bend Country of Texas	Data	1962
Nonnative and Invasive Species		
Exotic Plant Monitoring in the Chihuahuan Desert Network: 2011 Annual Report	Data	2012
Report of 2010 Research Activities Effect of Biological Control of Saltcedar (*Tamarix* supp.) on Athel (*Tamarix aphylla*) in Big Bend National Park, Texas	Data	2010
2008 and 2010 Saltcedar Beetle Release Season Final Reports	Data	2010
Development of Invasive Plant Species Monitoring Protocol for Park Units in the Chihuahuan Desert Network, National Park Service. Progress Report (October 2008–August 2009)	Monitoring Protocol	2009
Baseline Studies of Invasive African Buffelgrass (*Cenchrus ciliaris*) in Big Bend National Park, Texas **Restricted Access**	Data	2008
Early Detection of Invasive Species in Big Bend National Park: Remote Sensing and GIS Strategies	Monitoring Strategy	2008
Feral Hog Distribution Survey and Trapping Report, North Rosillos Area, Big Bend National Park	Data	2008
Early Detection of Invasive Species in Big Bend National Park: Remote Sensing and GIS Strategies	Monitoring Strategy	2007
Low-Stress Livestock Management: Low-Stress Livestock Handling, Natural Horsemanship, and Ranch Roping Operations Manual	Management Strategy	2007
Boquillas Canyon Binational Tamarix Eradication Project Trip Report	Data	2006
Home Range and Movement of Nutria (*Myocastor coypus*) along a Stretch of the Rio Grande River, Big Bend National Park, Texas **Restricted Access**	Data	2006
Habitat Use and Food Habits of Nutria (*Myocastor coypus*) in the Rio Grande Village Area of Big Bend National Park	Data	2005
Feral Hogs and Water Sources in Big Bend National Park	Data	2004

Name	Type	Published
Nonnative and Invasive Species (continued)		
Exotic Plant Management Team Annual Report	Data	2003, 2002
Big Bend National Park Beaver Pond Vegetation Monitoring Strategy: Evaluating Potential Impact of Nutria: Final Report June 2002	Monitoring Strategy	2002
Mosquito Control for the Rio Grande Village Area of Big Bend National Park	Data	1961
Geology		
Geologic Resources Inventory Project for Big Bend National Park	Data	2011
Soil Survey of Big Bend National Park, Texas	Data	2011
Landscape Scale		
Natural Resource Condition Assessment	Data	2013
Analysis and Summary of Boquillas Canyon Monitoring Data Big Bend National Park **Restricted Access**	Data	2009
Inventory of Big Bend National Park and Rio Grande Wild & Scenic River Park Brief	Data	2009
State of the Parks: Big Bend National Park A Resource Assessment	Data	2003
Big Bend National Park – "Texas' Gift to the Nation": Challenges and Opportunities in the New Millennium	Data	2001
Historic Reconstruction of the Ecology of the Rio Grande / Rio Bravo Channel and Floodplain in the Chihuahuan Desert Report prepared for Chihuahuan Desert Program, World Wildlife Fund	Data	2000
Natural Sounds and Night Skies		
Big Bend National Park Acoustic Monitoring 2010	Data	2013
Night Sky Evaluation Report: Big Bend National Park, Texas	Data	2004
Park History and Management		
Compendium: Big Bend National Park, Rio Grande Wild and Scenic River	Data	2013
Conservation Assessment, Commission for Environmental Cooperation	Data	2013
Regional Perspectives and Opportunities for Feral Hog Management in Texas	Management Strategy	2005
Protecting Biodiversity in the Chihuahuan Desert Transboundary Corridor: A Strategy for Binational Collaborative Management	Data	2002
Annual Performance Plan Fiscal Year 1999 Big Bend National Park, Rio Grande Wild and Scenic River	Data	1999
Statement for Management: Big Bend National Park	Management Strategy	1992
Statement for Management	Management Strategy	1991
Statement for Management: Big Bend National Park. **Restricted Access**	Management Strategy	1986

Name	Type	Published
Park History and Management (continued)		
Management Review	Data	1979
Statement for Management	Management Strategy	1976
Report on the Conference with Mexican Representatives Concerning the Proposed Big Bend	Data	1935
Paleontology		
Paleontological Resource Inventory and Monitoring: Chihuahuan Desert Network	Data	2007
Paleocene Dicotyledonous Trees from Big Bend National Park, Texas: Variability in Wood Types Common in the Late Cretaceous and Early Tertiary, and Ecological Inferences	Data	1991
Research History		
Biology of the Rio Grande Border Region: A Bibliography	Data	1997
Bibliography, Summary, and Recommendations for Scientific Research at Big Bend	Data	1985
Big Bend National Park Biosphere Reserve: A History of Scientific Study. Volume I – A Narrative Description of Scientific Study. US Man and the Biosphere Program, US MAB Report No. 10	Data	1985
Transportation		
The Road Inventory of Big Bend National Park BIBE – 7130 **Restricted Access**	Data	2005
The Road Inventory for Big Bend National Park	Data	1999
Traffic Safety Study Final Report Big Bend National Park, Chisos Basin Road	Data	1996
Materials Source Study Big Bend National Park	Data	1991
Vegetation		
Chihuahuan Desert Network: Plant Responses to Climate Change	Data	2013
Terrestrial Vegetation and Soils Monitoring Protocol and Standard Operating Procedures: Sonoran Desert and Chihuahuan Desert Networks, Version 1.1	Monitoring Protocol	2012
Gradsect and Field Sampling Plan for Big Bend National Park / Rio Grande National Wild and Scenic River	Data	2011
Vegetation Classification List Update for Big Bend National Park and Rio Grande National Wild and Scenic River	Data	2011
Monitoring Long-Term Vegetation Dynamics in Big Bend National Park Ecological Survey of the Big Bend Area Monitoring Report 2007–2008	Data	2010
Post-Grazing Changes of Vegetation in Big Bend National Park, Texas: A 50-Year Perspective	Data	2010
Vegetation Inventory Study Plan for Big Bend National Park and Rio Grande Wild and Scenic River	Data	2010
Assessment of Top Down and Bottom Up Controls on Fire Regimes and Vegetation Abundance and Distribution Patterns in the Chihuahuan Desert Borderlands: A Hierarchical Approach	Data	2006
Fire Ecology of Desert Grasslands, Big Bend National Park Description of Experimental Plots, Evaluation of a Natural Burn, and Literature Review Contribution No. 120	Data	1982
Fire Use Plan and Report for Boot Canyon Plot 4 Research Burn	Data	1980

Name	Type	Published
Visitor Use		
Big Bend Visitor Use Resource Brief	Data	2010
Big Bend National Park, Rio Grande Wild & Scenic River, Texas Santa Elena Canyon – Visitor Use	Data	1996
Visitor Services Project: Big Bend National Park	Data	1993
A Survey and Analysis of the Use Patterns in Santa Elena Canyon (Big Bend National Park) during the Thanksgiving Vacation Period 1980	Data	1981
Water		
Environmental Flows Recommendations Report. Final Submission to the Environmental Flows Advisory Group, Rio Grande Basin and Bay Area Stakeholders Committee and Texas Commission on Environmental Quality	Data	2012
Streamflow Gains and Losses and Selected Water-Quality Observations in Five Subreaches of the Rio Grande / Rio Bravo del Norte from near Presidio to Langtry, Texas, Big Bend Area, United States and Mexico, 2006: US Geological Survey Scientific Investigations Report 2012-5125	Data	2012
Historical Perspective of Surface Water and Groundwater Resources in the Chihuahuan Desert Network, National Park Service	Data	2009
Assessing the Effects of Historical Mining in the Rio Grande / Rio Bravo Watershed, Big Bend National Park Area, Texas and Mexico	Data	2006
Chihuahuan Desert Network Water Resource Information and Assessment Report Phase II	Data	2006
Identification of Issues, Monitoring Objectives, and Approach for Development of a Water-Quality Assessment Plan for the Rio Grande in Big Bend National Park, Texas: Administrative Report.	Data	2001
Baseline Water Quality Data Inventory and Analysis Big Bend National Park	Data	1995
Binational Study Regarding the Presence of Toxic Substances in the Rio Grande / Rio Bravo and Its Tributaries along the Boundary Portion between the United States and Mexico	Data	1994
Hydrogeology, Geochemistry, and Quality of Water of the Basin and Oak Springs Areas of the Chisos Mountains	Data	1993
Big Bend National Park Water Resources Scoping Report	Data	1992
Aquatic Ecosystems of Big Bend National Park Biological and Chemical Indicators of Water Quality	Data	1980
Aquifer Test of Geothermal Spring 4, Rio Grande Village, Big Bend National Park	Data	1980
Reconnaissance Investigation of the Ground-Water Resources of the Upper Rio Grande Basin, Texas. Texas Water Commission Bulletin 6502	Data	1965
Wilderness		
Wilderness Study	Data	1971



Intermountain Region Foundation Document Recommendation
Big Bend National Park

April 2016

This Foundation Document has been prepared as a collaborative effort between park and regional staff and is recommended for approval by the Intermountain Regional Director.

Cindy Ott-Jones 4/20/2016

RECOMMENDED
Cindy Ott-Jones, Superintendent, Big Bend National Park **Date**

Sue E. Masica 5/25/16

APPROVED
Sue E. Masica, Regional Director, Intermountain Region **Date**

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and 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 by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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May 2016

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NATIONAL PARK SERVICE • U.S. DEPARTMENT OF THE INTERIOR