

National Park Service  
U.S. Department of the Interior

Guadalupe Mountains National Park  
Texas

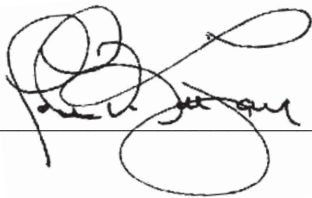


# Resource Stewardship Strategy

June 2009

# Guadalupe Mountains National Park Resource Stewardship Strategy

Approved by: \_\_\_\_\_



*Superintendent, Guadalupe Mountains National Park*

\_\_\_\_\_  
June 18, 2009

*Date*

Cover art:  
Watercolor of El Capitan and the Guadalupe Mountains by  
Phil Thys, Denver Service Center



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# EXECUTIVE SUMMARY

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## OVERVIEW OF A RESOURCE STEWARDSHIP STRATEGY

A Resource Stewardship Strategy (RSS) is a park program plan that includes strategies for managing natural and cultural resources. It is based on science and scholarship and is designed to achieve and maintain desired conditions for resources. The desired conditions for resources are spelled out in a park's general management plan (GMP). The resource stewardship strategy is a link between the general management plan and park strategic planning, where personnel and financial resources are allocated to implement stewardship activities.

The major components of the RSS include:

- a description of the park's fundamental (and other important) resources and values and their desired conditions,
- the status of knowledge of these resources,
- identification of indicators and target values that allow the NPS to measure current conditions against desired conditions,
- and comprehensive strategies and funding needed to achieve or maintain desired conditions.

## FUNDAMENTAL AND OTHER IMPORTANT RESOURCES AND VALUES – DESIRED CONDITIONS

The first step in developing comprehensive strategies is to identify the resources and values that the National Park Service is responsible for preserving at Guadalupe Mountains National Park.

Fundamental, and other important, resources and values support the purpose and significance of the park by identifying the characteristics (park features, processes, resources, and values) that park managers need to pay attention to. The park's general management plan did not identify fundamental or other important resources and values for the park. They were identified and described at a workshop held on July 24, 2007 during the development of the resource stewardship strategy.

### Fundamental Resources and Values

#### Geologic Resources

- Capitan Reef and Related Deposits
- Western Escarpment Geological Section
- Salt Basin

#### Scenic Resources

- Unobstructed Views

#### Natural Resources

- Natural Hydrologic Processes
- Northern Chihuahuan Desert biotic communities
- Riparian and Canyon Features
- Montane/Sky Island

#### Cultural Resources

- Archeological Resources
- Ranching Landscape
- Wallace Pratt Properties

#### Wilderness

### Other Important Resources and Values

Natural Caves and Karst  
Rare and Endangered Species  
Natural Diversity  
Spanish Exploration  
Present-Day Religious Practices  
Archives and Museum Collections

Desired conditions for these resources are attributed to servicewide mandates and policies, as well as guidance provided by the management zones established in the park's GMP.

## STATUS OF RESOURCE KNOWLEDGE

The second step in developing a resource stewardship strategy is to evaluate the body of knowledge for the park's resources and compare that to what has been accomplished relative to the desired conditions. This provides the park with an understanding of what kinds of information may be required to adequately assess resource condition and move the resource towards desired condition. The key findings include the following:

### Natural Resources

- A variety of natural resource inventories have been completed. Many inventories are still needed, including inventories for soils, caves, night skies, soundscapes, and groundwater; as well as ongoing inventories of paleontological resources and biological resources.
- A variety of natural resource reports and plans have been completed. Many studies, reports, and plans are still needed, including management plans for trails, exotic vegetation management, mountain lion-visitor safety, dunes, geologic resources, aoudad removal, and bighorn sheep reintroduction. Updates to a variety of plans are (or will be) also needed: integrated pest management (IPM), cave management, backcountry/wilderness management, land protection, and fire.
- A deficiency of resource information and knowledge on the park's salt basin/dunes and the groundwater resources on the west side of the park was acknowledged. Resource information and knowledge about the park's portion of the salt basin, dunes and underlying groundwater should be expanded to research geomorphic processes that sustain the dunes, monitor the groundwater and surface hydrology relationships, map geologic surficial deposits, and conduct monitoring to detect ecological changes due to activities external to the park.
- The Chihuahuan Desert Inventory & Monitoring Network (CHDN) has provided, and is currently contributing to, the understanding of park resources; however, information is still being compiled and synthesized for many resources.
- The park's natural resources respond to natural changes in the physical or biological attributes of the landscape in different ways, making it difficult to understand the range of natural variability and ecology (interactions) of many park resources. Additional research needs to be completed to develop and select appropriate indicators and target values for some resources.
- The Chihuahuan Desert Inventory & Monitoring Network (CHDN) is currently developing monitoring protocols for Guadalupe's Vital Signs. Until this process is completed, a determination cannot be made as to whether or not certain monitoring protocols can be used in their entirety without any changes for RSS purposes, or if they need to be modified.

### Cultural Resources

- A variety of resource inventories have been completed. Many cultural resource inventories are needed, including approximately eight cultural landscape inventories.
- A variety of reports and plans have been completed. Many studies, reports, and plans are still needed, including five cultural landscape reports and five historic structure reports; specialized reports and plans for Frijole Ranch; and management plans for rock art and four cultural landscapes. Updates to a variety of plans will also be needed over time.
- Research on ethnographic resources, ranching artifacts, geology and the park's scientific legacy, and several historic structures (backcountry cabins) is needed.



## INDICATORS OF RESOURCE CONDITION AND TARGET VALUES

The third step of the RSS process is to select indicators and establish target values. Indicators are measurable parameters that allow a park to assess the condition of its resources. Target values are values that represent desired conditions and allow a park to compare the current condition of a resource with its desired condition. Selecting indicators and establishing target values is a difficult task, often pursued with imperfect or sometimes inadequate information. A total of 52 indicators were selected to measure resource conditions at Guadalupe Mountains National Park. Some indicators were used for multiple resources, especially for cultural resources and museum collections. Therefore, only 35 of the 52 indicators are unique to specific resources.

Of the 52 indicators selected, target values were established for 35 of them. Target values were not developed for the following resources due to inadequate information: caves and karst, dark night skies, soundscapes, and certain water resource parameters. In some cases “interim” target values were established until such time that they can be refined through additional data collection and monitoring efforts. Additional research and planning is needed to identify appropriate indicators and concise targets for these resources.

The current condition of many resources also could not be determined—additional research and monitoring is required to evaluate their condition. Consequently, it is not possible to determine whether or not target values have been met for many resources.

**Table A: Targets Met**

Resource	Number of Targets	Number of Targets with Target Values Identified	Number of Targets with Target Values that have Information on Current Conditions	Number of Target Values Met
Geologic Resources	12	5 of 12	4 of 5	2 of 4
Scenic Resources	7	3 of 7	1 of 3	0 of 1
Natural Resources	16	10 of 16	5 of 10	1 of 5
Cultural Resources	17	17 of 17	16 of 17	4 of 16

## COMPREHENSIVE STRATEGIES FOR ACHIEVING DESIRED CONDITIONS

The final step of the RSS process is the development of comprehensive strategies and associated activities to assure that the National Park Service is attaining and maintaining the desired conditions for all park resources and values. Guadalupe’s comprehensive strategies address all four major resource types in the park (geologic, scenic, natural, and cultural) as well as strategies for resource program management and the completion of plans, reports, and inventories needed. The comprehensive strategies consist of 172 activities that address one of four primary needs:

- Filling data gaps necessary to define and evaluate indicators and target values for park resources.
- Monitoring and managing park resources to assure that target values for each indicator are achieved.

- Implementing research or resource management activities required by legislation or the park’s general management plan.
- Implementing best management practices and activities that are designed to improve resource conditions.

## **FUNDING GUADALUPE’S RESOURCE STEWARDSHIP**

One purpose of the RSS is to guide NPS investment (human and fiscal) in the stewardship of cultural and natural resources. The RSS assigns funding needs for implementing RSS strategies (via projects) to base and project funding, and also provides a means of accountability for funds used to attain and maintain desired conditions.

Currently, funds allocated for resource stewardship (i.e., natural and cultural resource management) at Guadalupe account for 14% of the park’s total budget (approximately \$391,000 of \$2.76 million). In the previous 5 years, spending on resource management accounted for as little as 11% of the park’s total annual expenditures. RSS budget projections show that the cost of resource management is about twice that of current spending. To meet desired resource conditions, the percent of funding allocated to resource stewardship in the park would have to grow from \$391,000 (14%) in FY2008 to about \$674,000 (23%) in FY2014.

The park has targeted several project funding sources to help meet this need, such as: the Servicewide Comprehensive Call, and partnerships with the Chihuahuan Desert Inventorying & Monitoring Network and the Natural Resource Program Center (NRPC). Increases to ONPS park base funding would also be required to meet the park’s resource management needs and the goals of this RSS. Three additional positions (a term environmental planner, a term data manager, and a seasonal resource technician) were identified as being essential to implementing the comprehensive strategies and achieving the park’s desired conditions.

## **UNIQUE ELEMENTS OF THIS PILOT RESOURCE STEWARDSHIP STRATEGY**

Several elements of Guadalupe’s resource stewardship strategy are worth highlighting for the benefit of the other pilot projects, as well as those that are initiated later in time. It is the park’s hope that this product will add to the body of knowledge of the RSS program and be used by other parks where relevant and appropriate.

The following elements are unique to Guadalupe’s resource stewardship strategy:

- Identification of the park’s fundamental (and other important) resources and values, but no further development of a foundation statement.
- Inclusion of nontraditional partners and outside agency personnel in the planning process.
- Development of indicators and target values that are as precise and quantifiable as possible.
- Integration of Natural Resource Program Center (NRPC) staff and products in the process.
- Establishment of the timing and priority of all comprehensive strategies.
- Development of a project management system that can support implementation of the resource stewardship strategy.

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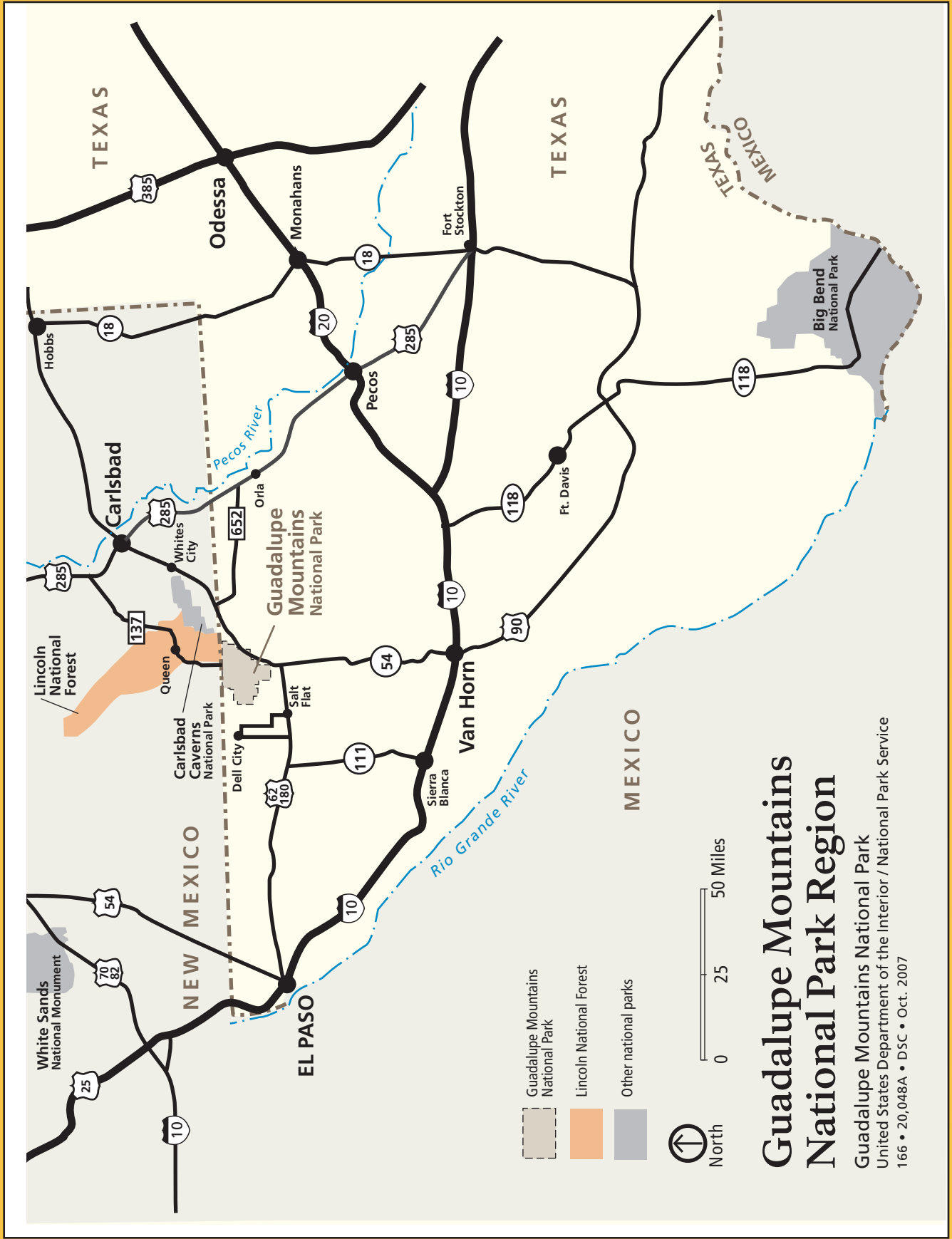
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Figure 1. Region map (Source: Draft GMP, 2008)





## WHAT IS A RESOURCE STEWARDSHIP STRATEGY?

A Resource Stewardship Strategy (RSS) serves as a bridge between the qualitative statements of desired conditions for resources and resource condition-dependant visitor experiences established in a park's general management plan (GMP) and the measurable goals and implementation actions determined through park strategic planning. The resource stewardship strategy is not a decision-making document. Instead it is an analytical document that focuses on identifying and tracking indicators of desired conditions, recommending comprehensive strategies to achieve and maintain desired conditions over time, and assessing and updating these comprehensive strategies periodically based on new information and the results of completed activities. It provides the park with a strategy for investing both human and fiscal resources in stewardship of natural and cultural resources. It also reports accountability toward progress in attaining and maintaining desired resource conditions at the park.

A park's fundamental (and other important) resources and values are the foundation that the resource stewardship strategy builds upon. They are the key resources that the RSS seeks to maintain or improve the quality of.

At the heart of developing a resource stewardship strategy is identifying and selecting indicators of resource condition and developing target values that represent desired conditions. Together these two components allow park managers to measure the status of their resources relative to desired conditions and then develop comprehensive strategies that are designed to achieve or maintain desired conditions.

**Fundamental (and Other Important) Resources and Values** – Resources and values that are critical to achieving the park's purpose and maintaining its significance.

**Desired Conditions** – A qualitative statement established in the GMP that describes the condition of a resource that the park is seeking to achieve.

**Attribute** – A feature of the resource that helps describe the resource and corresponds to resource condition. Attributes are broad categories that can be used as indicator topics.

**Indicator** – A measurable resource attribute that provides information on a resource's current condition relative to its desired conditions. An indicator is only a representation of relative condition.

**Target Value** – A quantifiable indicator value that represents the desired condition.

**Comprehensive Strategy** – A sequence of activities or actions, which are based on adequate science and scholarship, that enable the park to achieve or maintain desired conditions for the affected resource.

Figure 2 on the next page illustrates the flow and decision points of the RSS planning process.

# Resource Stewardship Strategy: Planning Components and Process

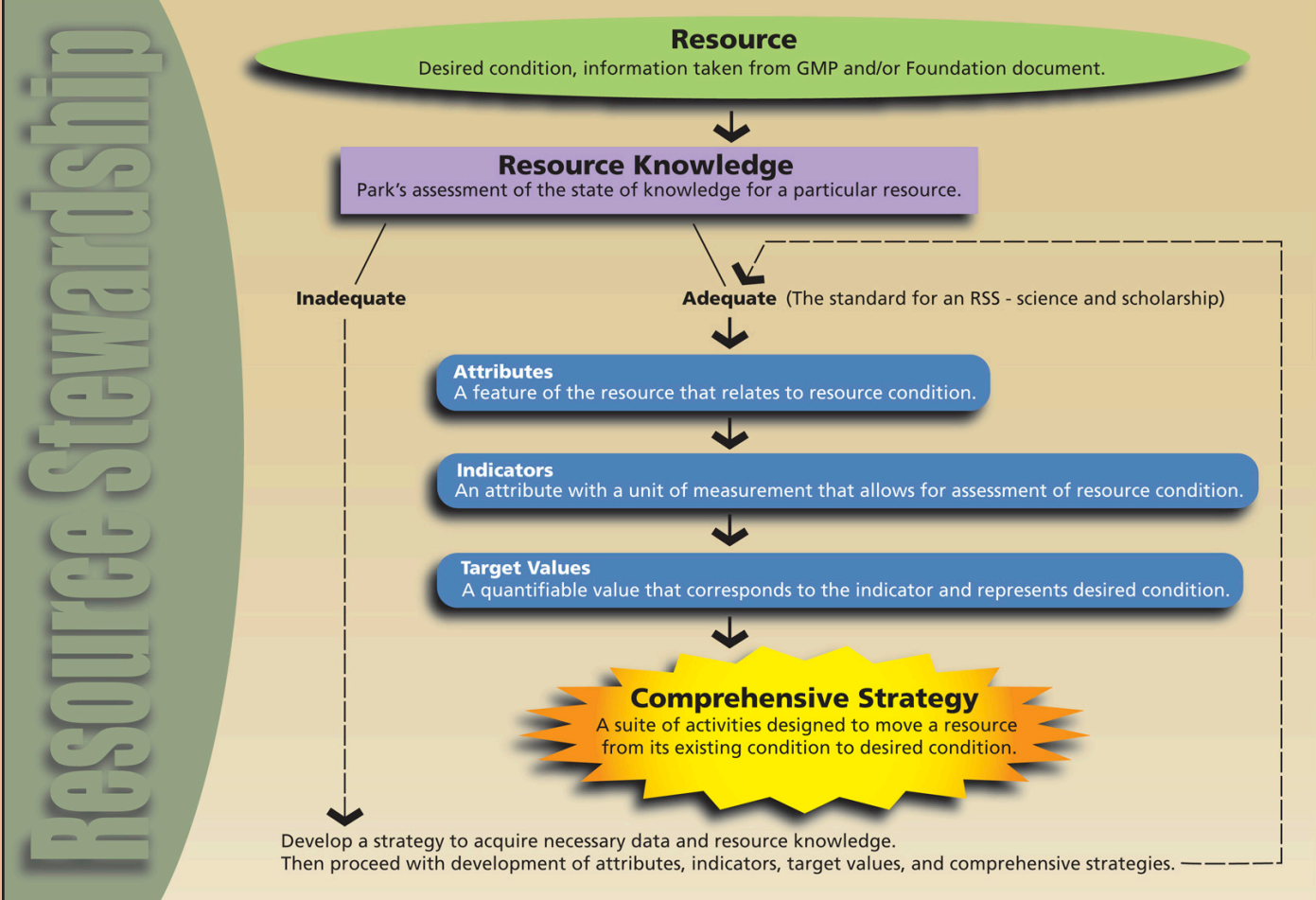


Figure 2. RSS Planning Components and Process

The expert-reviewed comprehensive strategies of the stewardship strategy focus on an integrated, interdisciplinary approach. Preparation of a resource stewardship strategy is accompanied by consultations with stakeholders who have interest in resources within and in areas adjacent to the park, ensuring that these stakeholders understand the role of the resource stewardship strategy in the park planning framework (see Appendix A for a list of stakeholders and participants in Guadalupe’s resource stewardship strategy).

Implementation of a resource stewardship strategy and its comprehensive strategies should include the identification of a reasonable range of alternatives to attain and maintain desired conditions. These implementation alternatives would be the subject of appropriate environmental planning and compliance documentation when specific actions or undertakings are considered. The authority for the resource stewardship strategy lies within (and is limited by) draft Director’s Order 2-1: *Resource Stewardship Planning* and the park’s general management plan and its associated environmental compliance documents. Implementation of the strategy will proceed as funds are made available.

## **PARK PURPOSE, SIGNIFICANCE, AND FUNDAMENTAL AND OTHER IMPORTANT RESOURCES AND VALUES**

### **Park Purpose**

Park purpose statements reaffirm the reasons for which a national park was set aside as a unit of the national park system and provide the foundation for national park management and use.

The purposes of Guadalupe Mountains National Park are as follows:

1. To preserve an area possessing outstanding, globally unique geological features together with scenic, natural, and cultural values of great significance.
2. To manage a designated wilderness area where the earth and its community of life are untrammelled, and where humans are visitors who do not remain.
3. To provide opportunities for visitors to understand, enjoy, appreciate, and experience the unique nature of the park.
4. To provide educational and research opportunities that enhance stewardship and wider understanding of resources.

### **Park Significance and Associated Resources and Values**

Park significance statements capture the essence of a national park's importance to our country's natural and cultural heritage. Significance statements do not inventory national park resources, but instead answer questions about why a park's resources are distinctive and how they contribute to our natural heritage. Defining a national park's significance helps managers make decisions that preserve the resources and values necessary to accomplish that park's purpose.

Fundamental resources and values are those resources that are critical to achieving a park's purpose and maintaining its significance. If the fundamental resources and values are degraded, the park significance could be jeopardized. Fundamental resources and values are derived primarily from analyzing the park significance statements and determining the critical attributes that make up each significance statement. They elaborate on what is most important about the park and may include systems, processes, features, visitor experiences, stories, scenes, sounds, smells or other resources and values. The fundamental resources and values are part of the foundation for all planning and management at the park. They provide focus and allow the park to prioritize its management resources and actions.

Limiting fundamental features to those resources and values related directly to the park purpose and significance does not preclude the consideration of other resources and values. Other important resources and values include those resources and values that are determined to be important in their own right, even though they are not fundamental to the park's purpose and significance. They may be supportive of the park's mission or they may be resources and values associated with other statutes and NPS policies affecting the stewardship of resources within the park.

The park's GMP did not identify fundamental or other important resources and values for the park. They were identified and described in order to support development of the resource stewardship strategy at a workshop held on July 24, 2007.

### **SIGNIFICANCE STATEMENT 1 – GEOLOGIC RESOURCES**

Guadalupe Mountains National Park is situated at the western terminus of the world's most extensive and well-exposed fossil reef, including related shelf and basinal rocks, which have achieved international designation as the world's best example of Middle Permian geology.



- A tremendous earth fault on the west side of the park attracts major geological interest because it exposes numerous classical depositional settings superimposed over a long interval of geologic time.
- The western area of the park contains excellent examples of playa depositional systems, including evaporite minerals, salt lake shorelines, and areas of aeolian dunes.

*Fundamental Resources and Values:*

**Capitan Reef and Related Deposits-** The Middle Permian Capitan Reef system is one of the world's largest and best preserved fossil reefs. Between 260 and 270 million years ago this reef lined approximately 400 linear miles of the margin of an ancient inland sea known as the Delaware Basin. It is also one of the world's best exposed fossil reefs, complete with rocks representing the entire associated depositional environments from lagoon, outer shelf, back reef, reef, forereef slope, and deep basin. The entire three-dimensional character of these deposits and the sequence of transition from one to the other are readily observable at many places along the 11 miles of the reef exposed within the park. These rocks preserve an astounding diversity of fossil organisms that inhabited those ancient environments. These fossils illustrate the abundance, diversity, and complex interactions characteristic of organisms inhabiting reef systems throughout geologic time.

- Type Localities- numerous locations within the park from which fossil species were first reported in scientific literature
- Type Sections- several locations within the park where geological formations and members were first described in scientific literature

Capitan Reef and  
El Capitan.  
NPS Photo.





**Western Escarpment Geological Section-** This faulted exposure of a one mile-thick and 10 mile long slice of Middle Permian marine rocks were deposited during 15 million years of geologic time. This continuous vertical accumulation clearly demonstrates the depositional sequence that lead to the formation of the Capitan Reef system.



Western Escarpment.  
NPS Photo.

- **Guadalupian Stratotype-** The park contains the world's only reference standard for the Middle Permian portion of the geologic time scale, an interval of time now known as the Guadalupian Epoch. The three component subdivisions of this time interval, the Roadian, Wordian, and Capitanian Ages, are also designated within the park. These designations as Global Stratotype Section and Points (GSSP) are conferred only after exhaustive study by a committee of the International Union of Geological Sciences determines that the geology of one area is the world's best representative for that time interval. These unique resources were previously, and will continue to be, focal points of geological research.

Salt Flat.  
NPS Photo.

**Salt Basin-** Landforms here record the existence of a large isolated lake that gradually dried and became a playa lake basin during the last 10,000 years of the Quaternary Epoch. Progressive shrinking of the lake left behind classic geomorphic features such as coppice dunes, salt lake deposits, shoreline terraces, shoreline dune ridges, and the second largest gypsum sand dune field in North America.



*Other Important Resources/Values:*

**Caves and Karst** – The limestones of the Capitan Reef system within the park contain at least 25 documented caves. Many contain beautiful travertine cave formations, as well as providing roosting areas for bats. A number of these caves contain deposits of Pleistocene Age animals and plants that attest to the diversity of life in the Guadalupe Mountains long ago when the area was much wetter than now. Among the extinct animals whose bones are found in these caves are giant ground sloths, horses, tiny pronghorn antelope, and a species of large vulture. Some caves preserve evidence of early human inhabitants. The paleontologic record of some caves has been partially studied but little is known of currently active cave biota.

Eons of rain and running water have sculpted the limestones of the high mountain ridges into classic karst landscapes with steep canyons, towering rock spires, sinkholes, and springs. Fractures in the limestone capture rainfall and channel it downward to feed numerous springs and recharge aquifers. The Guadalupe Mountains create their own rainfall and capture it, thereby becoming an important recharge area for fresh drinking water.

Right:  
Brachipod.  
NPS Photo.

Below:  
Sponge.  
NPS Photo.



**Museum Collections**- Type specimens of fossils from the park's classical Permian geological outcrops are the original reference items for named species and are crucial voucher specimens that help to document the great diversity of organisms that lived just before and during the accumulation of the Capitan Reef. In addition, field notes provide basic data necessary for documenting the geological context of collected specimens. Research documents identify the scientific significance of geological resources.

**SIGNIFICANCE STATEMENT 2 – SCENIC RESOURCES**

Stark contrasts between mountains and desert, overwhelming vistas stretching as far as the eye can see, brilliant fall colors created by the unusually plentiful vegetation, deep rock-ribbed canyons and sparkling white dunes contribute to the extraordinary scenic beauty of the Guadalupe.

*Fundamental Resources and Values:*

**Unobstructed Views** – These views are an important reason that visitors are allured and drawn to the Guadalupe's. Unobstructed views into the park from the surrounding Chihuahuan Desert, as well as views from the park back out to that same desert and beyond are an important part of the park experience.

El Capitan.  
NPS Photo.



- El Capitan—Historically, as an important landmark, was an icon on the western horizon to travelers as they journeyed from the east to the frontier town of El Paso and beyond. Its iconic status continues today both with travelers traveling along US Highway 62/180 to the modern city of El Paso and as an icon for the state of Texas.
- Guadalupe Peak—At 8,749 feet, Guadalupe Peak is the highest point in Texas. Silhouetted against the setting sun, together with El Capitan, it remains a significant landmark for the surrounding region. As the highest vantage point in the region as well as the state it provides spectacular views of the surrounding desert, and distant mountain ranges continually lure visitors to its summit.



- Night Skies-Because of its remoteness, Guadalupe Mountains National Park provides an excellent vantage point to view from one of the southern most locations in the United States an unobscured night sky, where a myriad of stars, galaxies, planets and other celestial bodies are revealed.
- McKittrick Canyon—In the fall of every year McKittrick Canyon puts on a display of vibrant colors of yellow, red, and gold as many of the deciduous trees and shrubs prepare for winter. This display is unique in the region with many visitors traveling hundreds of miles to spend hours in the canyon viewing the beautiful scenery.
- Gypsum Dunes - Stretching for miles, the shimmering expanse of undulating eolian dunes are comprised almost entirely of white gypsum sand. This expanse of white is second only in the United States to those of Whites Sands National Monument, the world’s largest gypsum dune field in south central New Mexico.
- Views of the Western Escarpment - Dramatically and majestically ascending over 5,000 feet skyward, the western escarpment forms an apparently impenetrable wall that towers above the desert floor. With El Capitan and Guadalupe Peak on its southern terminus, the escarpment presents a signature view of the park to visitors approaching from the west.
- Views of Canyons Throughout the Park - Dramatic views of the deep canyons incising the Guadalupe Mountains contribute significantly to the visitor experience of the park’s backcountry users.
- Wilderness Character – The wild and rugged landscape of the Guadalupe Mountains Wilderness, along with the solitude it offers, provides visitors an outstanding wilderness experience.

McKittrick Canyon  
NPS Photo.



***Other Important Resources/Values:***

**Air Quality** — The park is designated as a Class I air quality area. Internal and external forces must be considered in the park’s desire to maintain high quality air and good visibility.



Salt Basin Dunes.  
NPS Photo.

**SIGNIFICANCE STATEMENT 3 – NATURAL RESOURCES**

Guadalupe Mountains National Park is an island within an arid sea where an interface of Chihuahuan Desert, Rocky Mountain, and Great Plains flora and fauna was isolated by environmental changes. It contains relict and endemic montane, canyon, and aquatic species in a delicate balance created by elements of physical geography, latitude, climate, and hydrology.



*Fundamental Resources and Values:*

**Wilderness** – The Guadalupe Mountains Wilderness contains a diversity of natural areas ranging from semidesert grasslands to the Petran Montane Conifer Forest. The wilderness allows natural processes to occur in a rugged environment while minimizing long-term intrusions from human disturbance.

**Natural Hydrologic Processes** – Water resources in the park occur naturally and are uninterrupted, providing unique habitat for aquatic species within the Guadalupe Mountains.

- Aquatic Species - McKittrick Creek, a perennial stream, creates an interior riparian deciduous forest community that provides rare habitat for aquatic species in a desert environment.
- Water resources, including groundwater recharge, perennial streams, springs, seeps, and the travertine that allows them to appear, occur in various areas of the park, sustaining and enhancing vegetation and lifeforms.



Right:  
Bone Spring.  
NPS Photo.

Below:  
Manzanita Spring.  
NPS Photo.

Bottom:  
McKittrick Creek.  
NPS Photo.





**Northern Chihuahuan Desert communities** – The park contains vegetative communities ranging from the grasslands and desert scrub that straddle the Rio Bravo/Rio Grande Valley to the isolated, north-south trending mountain ranges that are notable for the “Sky Island” nature of their biotas and contain specific indicator vegetative species.

- Chihuahuan Desertscrub – An array of succulent species. Indicator species include the Chihuahuan shrubs, such as creosotebush, mesquite, agave, lechugilla, and ocotillo. Stem succulents such as sotol and yucca are also dominant features of the desert scrub landscape. Other common shrubs include mimosa, acacia, mesquite, mariola, fourwing saltbush, tarbush, javelinabush, goldeneye, allthorn, and ocotillo.
- Semidesert Grassland – Grasslands generally occur on flat areas of deep alluvium while the shrublands dominate on more dissected terrain.
- Great Basin Conifer Woodland is represented in the pinyon-juniper groves of the eastern foothills and the West Dog Canyon region.
- The gypsum dunes area supports an assemblage of gypsum-dependent plants and animals.

Chihuahuan Desert  
NPS Photo.





**Riparian/Canyon** – McKittrick Canyon contains the largest of the park’s two perennial streams and includes the most diverse assemblage of riparian vegetation. Canyons contain Interior Riparian Deciduous Woodland in the bottoms and Madrean Evergreen Woodland on mesic slopes. The Interior Chaparral community is prevalent on south-facing canyon walls and mountain slopes.

Devil’s Den,  
North McKittrick.  
NPS Photo.





**Montane/Sky Island** – The park’s high elevation and natural setting allow for the rare occurrence of a montane forest that is known as a “Sky Island” within the desert.

- The higher elevations of the park allow for the growth of a sustainable suite of Rocky Mountain Conifer Forest, including ponderosa pine, douglas fir, southwestern white pine, and aspen.
- The “Sky Island” contains a relict forest species, douglas fir, that is a holdover from previous ages.

The Bowl.  
NPS Photo.



***Other Important Resources/Values:***

- **Rare and Endangered Species** – Due to the park’s varied landscapes and natural setting, a variety of rare and endangered species occur within park boundaries, including endemic species, federal- and state-listed species, and species of management concern. The Chihuahuan Desert has been identified as the third most biologically diverse desert ecoregion of the world, rivaled only by the Great Sandy-Tanami Desert of Australia and the Namib-Karoo of southern Africa (World Wildlife Fund 2000). Localized endemism occurs in several taxa where the basin and range physiography promotes isolation.
- **Natural Diversity** – The park provides a protected environment that allows natural diversity to be maintained and promoted. Fire, among other natural disturbances, is an important component of maintaining natural diversity.



## SIGNIFICANCE STATEMENT 4 – CULTURAL RESOURCES

The cultural resources of the Guadalupe reflect the continuous association of peoples characterized by spiritual connections and adaptations to a dynamic environment. Along with evidence of seasonal habitation dating to 13,000 years ago, the park contains archeological remnants of prehistoric occupation through the historic period of Spanish exploration. Historic remains of more permanent settlement occur as early as the 1850s and continue through the early years of the park's establishment.

### *Fundamental Resources and Values:*

#### Archeological Resources

- Prehistoric artifact scatters, hearths, cooking pits, rock art
- Proto-historic ceramics and roasting pits
- Historic Native American midden rings, rock art
- Pinery Station ruins – Period of significance is 1858–1885. Listed in the National Register in 1974.
- Emigrant Trail to California and Butterfield Stage Route segments – Determined eligible for inclusion in the National Register in 1978.
- Historic military encampments



Right:  
Pinery Station ruins.  
NPS Photo.

Below right:  
Frijole Ranch with  
Smith family.  
NPS Photo.

#### Ranching Landscape

- Frijole Ranch/Guadalupe Mountain Ranch – A farming and ranching operation that operated from 1876-1970. Listed in the National Register in 1978.
- Williams Ranch – The only ranching operation on the west side of the park. Period of significance is 1906-1915. Determined eligible for inclusion in the National Register in 2006.
- Grisham-Hunter Line Cabin – Associated with the consolidation of small scale operations into a successful corporate ranching entity. Period of significance is 1928-1940. Determined eligible for inclusion in the National Register in 2006.





### Wallace Pratt Properties

- Pratt Cabin – Summer home of conservationist associated with creation of the park. Period of significance is 1930-1945. Listed in the National Register in 1975.
- Ship on the Desert – Retirement home of conservationist associated with creation of the park. Period of significance is 1940-1956. Determined eligible for inclusion in the National Register in 2006.

Left:  
Pratt Cabin.  
NPS Photo.

### *Other Important Resources/Values:*

- Spanish Exploration – The de Vargas expedition commissioned by the Governor of Mexico first documented resources of Guadalupe Canyon and the Salt Flats in 1692. Apparently during the period of Spanish exploration, a Spanish soldier observed an image of the Lady of Guadalupe on the face of El Capitan, thereby providing the modern geographical name for the Guadalupe Mountains.
- Present-Day Religious Practices – Sites throughout the park hold sacred significance to Native Americans and Hispanic Catholics. Pilgrimages, offerings and other religious practices continue at certain locations today.
- Archives and Museum Collections – The park collections contain a substantial number of prehistoric and historic artifacts. Among these are various flaked stone tools, grinding stones, and ceramics from the park's prehistoric archeological sites. Historic artifacts include excavated materials from Buffalo Soldier encampments and battle sites, Mescalero Apache encampments, and numerous objects associated with local ranch homes and the ranching industry.

## SIGNIFICANCE STATEMENT 5 - WILDERNESS

Rugged and windswept, the Guadalupe Mountains provide wilderness opportunities to experience the unaltered dynamic of life in a remote landscape resplendent in its isolated beauty and inspirational solitude.

### *Fundamental and Other Important Resources and Values:*

The resources and values that support this significance statement have already been included and addressed as both fundamental, and other important, resources and values for the other four significance statements. Significance Statement 1 (Geologic Resources) includes natural physical resources that contribute to wilderness values. Significance Statement 2 (Scenic Resources) includes elements of wilderness character such as scenic views, natural landscapes, and solitude. Significance Statement 3 (Natural Resources) addresses wilderness and its attendant natural resources and processes. And Significance Statement 4 (Cultural Resources) includes cultural resources that may add to a visitor's discovery experience. Therefore, since these resources and values have already been addressed by the other four significance statements, it is not necessary to isolate the wilderness elements under a single significance statement—it would cause undue redundancy and confusion. Wilderness resources and values are addressed appropriately under each of the other four significance statements.





Guadalupe Mountains  
wilderness.  
NPS Photo.

## DESIRED CONDITIONS FOR RESOURCES

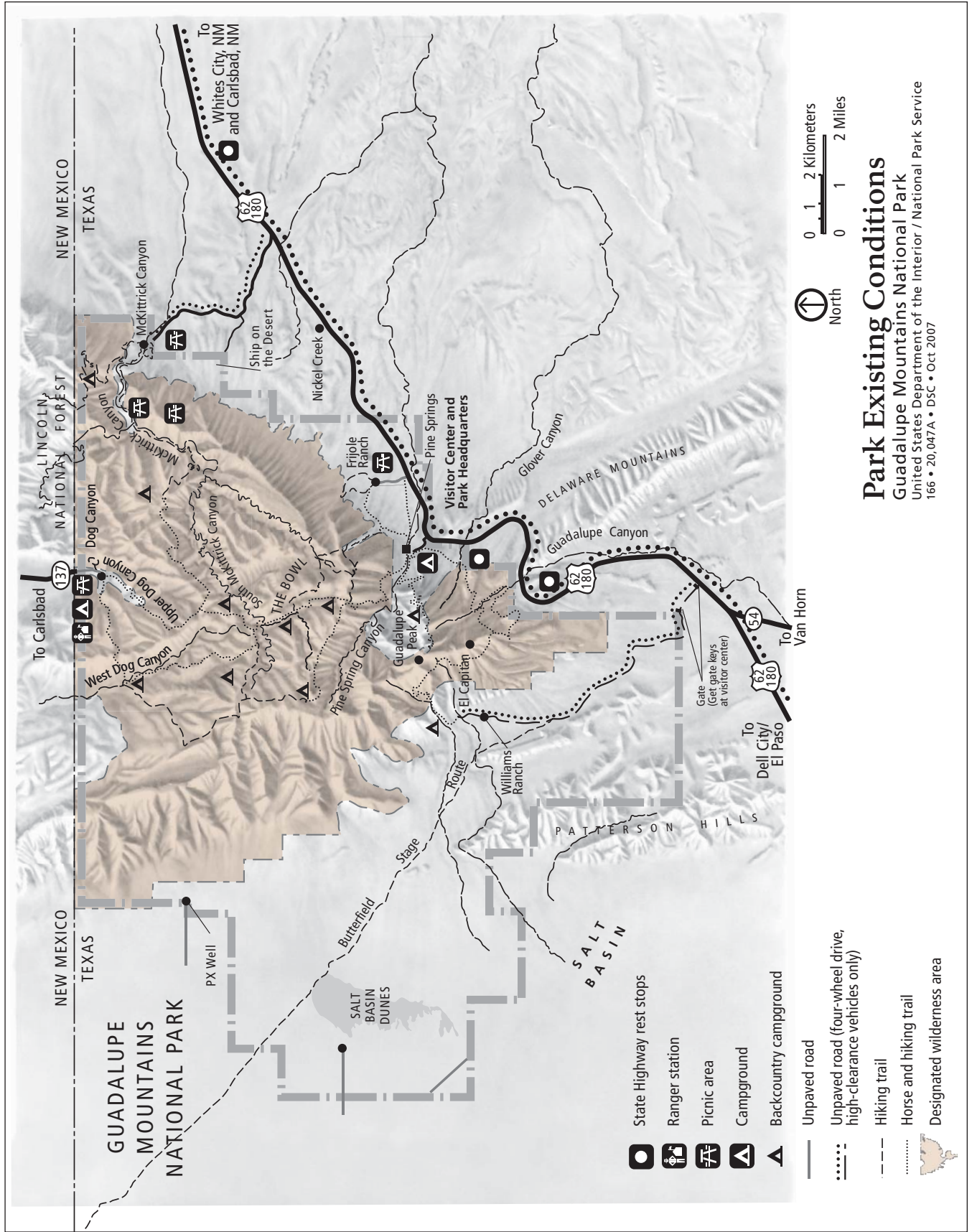
Desired conditions are qualitative statements established in a park's general management plan that describe the condition of a resource that the park is seeking to achieve. Desired condition information can be found in four places in *Guadalupe Mountain National Park's Draft General Management Plan*: 1) *Table 1: Conditions to be Achieved at Guadalupe Mountains National Park Based on Servicewide Mandates and Policies*; 2) a section on *Desired Conditions for Park Management*, 3) *Table 3: Management Zones*, and 4) *Appendix C: Servicewide Mandates and Policies*.

A general management plan delineates zones or districts that correspond to desired conditions for park management in a certain area. This delineation is called management zoning. Figure 3 displays the existing conditions within the park. The different desired conditions for resources, visitor experience, and appropriate management activities reflect the suitability of specific areas for specific uses. A range of management zones were used in *Guadalupe Mountain National Park's Draft General Management Plan* to provide the park with management direction for its wilderness settings, its transition areas, and its more developed, frontcountry settings (see Figure 4 on page 16).

The resource stewardship strategy provides park managers with recommended comprehensive strategies to achieve and maintain the desired conditions for the park's natural and cultural resources.



Figure 3. Existing conditions of park development (Source: Draft GMP, 2008)



### Park Existing Conditions

Guadalupe Mountains National Park  
 United States Department of the Interior / National Park Service  
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Figure 4. Management zones as established in the GMP (Source: Draft GMP, 2008)

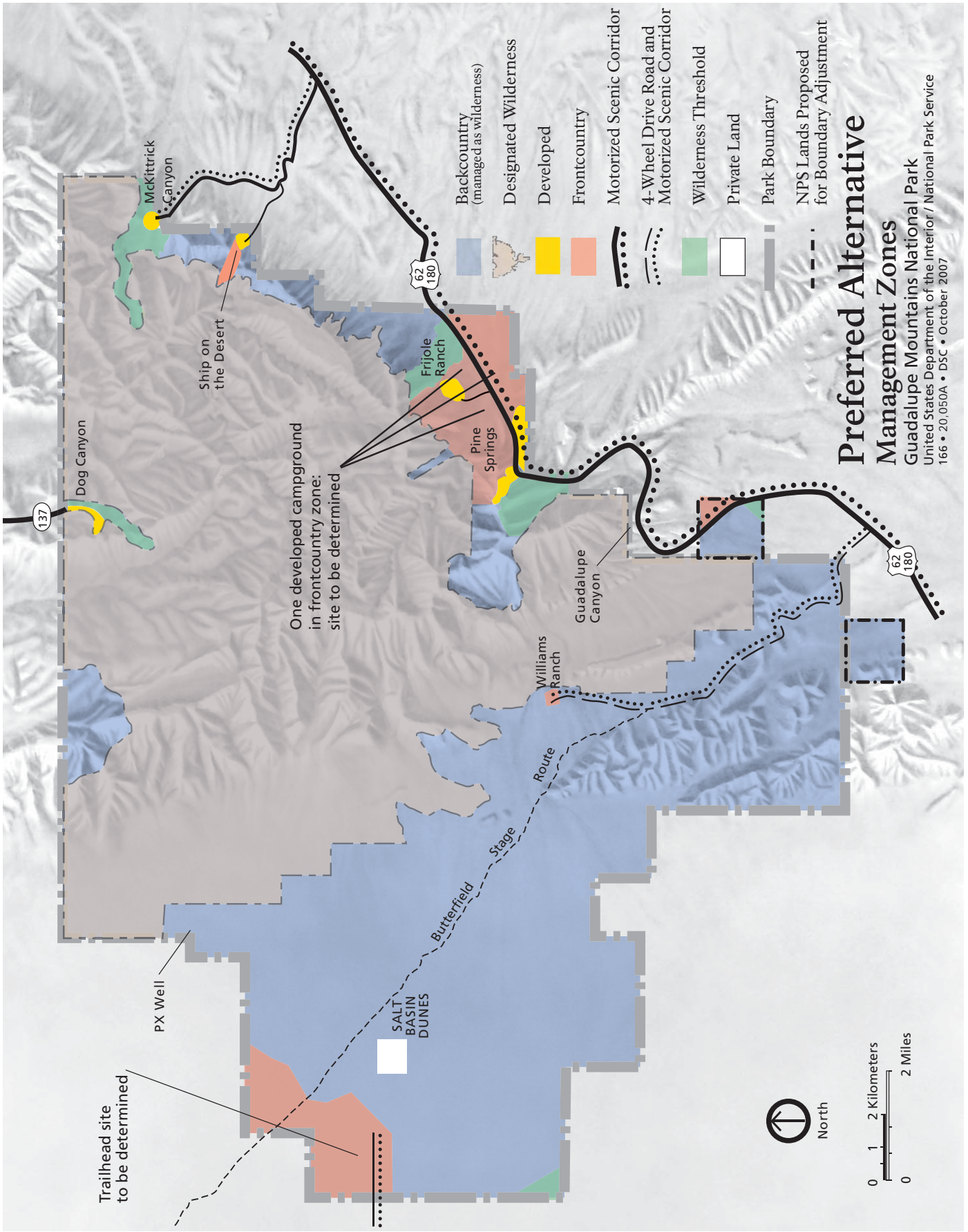




Table 1 contains desired conditions for various park resources based on existing law and policy. Table 2 contains information on desired conditions by management zone.

Appendix C of the draft general management plan contains more detailed information on desired conditions that relate to law and policy, along with a list of actions that the park will take to meet legal and policy requirements. Other parts of Appendix C of the general management plan can be considered best practices for resource stewardship and should be treated as part of the standard operating procedures of the park's resource management program.

## **Management Zones**

Six management zones are applied to the park: designated wilderness, backcountry, wilderness threshold, frontcountry, developed, and motorized scenic corridor. The purpose of each of these zones is described below. Desired resource conditions for each of these zones are identified in Table 2.

**Designated wilderness** - Only the lands that have been designated as wilderness by Congress in accordance with the Wilderness Act are assigned to the designated wilderness zone. These lands are managed to preserve wilderness resources and values, as prescribed by law.

**Backcountry** – The backcountry zone provides the same wilderness resource protection and visitor experience as the designated wilderness zone. However, the land in this zone has not been designated as wilderness in accordance with the Wilderness Act.

**Wilderness threshold** – Areas within the wilderness threshold zone have few facilities and services, and provide a relatively remote or isolated visitor experience.

**Frontcountry** – The frontcountry zone is generally applied to areas of moderate use in the more accessible, low-country parts of the park.

**Developed** – The developed zone includes the high-use areas of the park.

**Motorized scenic corridor** – Areas within the motorized scenic corridor zone provide access to improved visitor facilities, trailheads, historic and natural resource areas, and scenic resources in the low-country areas of the park.

## **Park Resources, Management Zones, and Desired Conditions**

Most of the park's resources are not segmented by management zones—they occur on the land without respect to management zones and they often cross zone boundaries. Consequently, the desired conditions for most resources are guided by the requirements of existing law and policy (referred to in the *Draft General Management Plan* as “Servicewide mandates and policies”). For example, paleontological resources occur throughout the park, and their management does not necessarily differ by management zone. The same is true for vegetation communities within the park; they cross management zone boundaries and the only guidance the management zones provide is related to the tolerance of human-caused resource impacts. The same is true for cultural resources; however, management zone descriptions do include guidance on the treatment and use of cultural resources. With few exceptions, the monitoring of both natural and cultural resources also would not be dependent on management zone boundaries. The desired conditions and target values for dark night skies and nonnatural sounds would be different for frontcountry and backcountry settings, which correlate (and could be assigned to) the management zones.

Table 1. Desired conditions based on servicewide mandates and policies

<b>Conditions to Be Achieved at Guadalupe Mountains National Park</b>	
Topic	
Relations with Private and Public Organizations, Owners of Adjacent Land, and Governmental Agencies	The park is managed as part of a greater ecological, social, economic, and cultural system. Good relations are maintained with adjacent landowners, surrounding communities, and private and public groups that affect, and are affected by, the park. The park is managed to resolve external issues and concerns and to ensure that park values are not compromised. Because the park is an integral part of a larger regional environment, the National Park Service works cooperatively with others to anticipate, avoid, and resolve potential conflicts, protect park resources, and address mutual interests in the quality of life for community residents. Regional cooperation involves federal, state, and local agencies, Indian tribes, neighboring landowners, and all other concerned parties.
Government-to-Government Relations between American Indian Tribes and the Park	The National Park Service and tribes culturally affiliated with the park maintain positive, productive, government-to-government relationships. Park managers and staff respect the viewpoints and needs of the tribes, continue to promptly address conflicts that occur, and consider American Indian values in park management and operation.
Natural Resources: Air Quality	Air quality in the park meets national ambient air quality standards for criteria pollutants and protects air quality-sensitive resources. Natural visibility conditions exist in the park and scenic views of the landscape are not impaired by human activities. [Recommended language from ARD; planned to go in Final GMP]
Natural Resources: Backcountry	Backcountry use is managed in accordance with a backcountry management plan (or other plan addressing backcountry uses) that is designed to avoid unacceptable impacts on park resources or adverse effects on visitor enjoyment of appropriate recreational experiences. The National Park Service seeks to identify acceptable limits of impacts, monitors backcountry use levels and resource conditions, and takes prompt corrective action before unacceptable impacts occur.
Natural Resources: Ecosystem Management	The park is managed holistically, as part of a greater ecological, social, economic, and cultural system.
Natural Resources: Exotic Species	The management of populations of exotic plant and animal species, up to and including eradication, is undertaken wherever such species threaten park resources or public health and when control is prudent and feasible.
Natural Resources: Fire Management	Park fire management programs are designed to meet resource management objectives prescribed for the various areas of the park and to ensure that the safety of firefighters and the public are not compromised. All wildland fires are effectively managed using the appropriate management strategy, including fire use, considering resource values to be protected and firefighter and public safety, using the full range of strategic and tactical operations as described in an approved fire management plan.

Table 1. Desired conditions based on servicewide mandates and policies (continued)

Conditions to Be Achieved at Guadalupe Mountains National Park	
Topic	
Natural Resources: Floodplains	<p>Natural floodplain values are preserved or restored. Long-term and short-term environmental effects associated with the occupancy and modification of floodplains are avoided. When it is not practicable to locate or relocate development or inappropriate human activities to a site outside the floodplain or where the floodplain will be affected, the National Park Service prepares and approves a statement of findings in accordance with Director's Order 77-2 uses nonstructural measures as much as practicable to reduce hazards to human life and property while minimizing impacts on the natural resources of floodplains.</p> <p>Ensures that structures and facilities are designed to be consistent with the intent of the standards and criteria of the National Flood Insurance Program (44 Code of Federal Regulations 60).</p>
Natural Resources: General Natural Resources / Restoration	<p>Native species populations that have been severely reduced in or extirpated from the park are restored where feasible and sustainable. Populations of native plant and animal species function in as natural condition as possible except where special considerations are warranted.</p>
Natural Resources: Geologic Resources	<p>The park's geologic resources are preserved and protected as integral components of the park's natural systems.</p> <p>Caves and karst are managed in accordance with approved cave management plans to perpetuate the natural systems associated with the caves and karst.</p>
Natural Resources: Land Protection	<p>Land protection plans are prepared to determine and publicly document what lands or interests in land need to be in public ownership, and what means of protection are available to achieve the purposes for which the park was created</p>
Natural Resources: Landscape Management and Night Sky	<p>Excellent opportunities to see the night sky continue to be available. Artificial light sources both within and outside the park do not unacceptably adversely affect opportunities to see the night sky.</p>
Natural Resources: Native Vegetation and Animals	<p>All native plants and animals in the park are maintained as part of the natural ecosystem.</p>
Natural Resources: Natural Soundscapes	<p>The National Park Service preserves the natural ambient soundscapes, restores degraded soundscapes to the natural ambient condition wherever possible, and protects natural soundscapes from degradation resulting from human-caused noise. Disruptions from recreational uses are managed to provide a high-quality visitor experience that is consistent with the goal to preserve or restore the natural quiet and natural sounds.</p>
Natural Resources: Paleontological Resources	<p>Paleontological resources, including both organic and mineralized remains in body or trace form, are protected, preserved, and managed for public education, interpretation, and scientific research.</p>

Table 1. Desired conditions based on servicewide mandates and policies (continued)

<b>Conditions to Be Achieved at Guadalupe Mountains National Park</b>	
Topic	
Natural Resources: Soils	The National Park Service actively seeks to understand and preserve the soil resources of the park, and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources. Natural soil resources and processes function in as natural a condition as possible, except where special considerations are allowable under policy.
Natural Resources: Threatened and Endangered Species	Federal and state-listed threatened and endangered species and their habitats are protected and sustained. Native threatened and endangered species populations that have been severely reduced in or extirpated from the park are restored where feasible and sustainable.
Natural Resources: Water Resources	Surface water and groundwater are protected and water quality meets or exceeds all applicable water quality standards.  Programs and facilities are maintained and operated to avoid pollution of surface water and groundwater. Watersheds are managed as complete hydrologic systems. This includes minimizing human-caused disturbance to the natural upland processes that deliver water, sediment, and woody debris to streams. Natural fluvial processes are allowed to proceed unimpeded, and stream processes that create habitat features are protected. Where stream manipulation is unavoidable, maximum use is made of techniques that are visually unobtrusive and that protect natural processes.
Natural Resources: Wetlands	The natural and beneficial values of wetlands are preserved and enhanced. A “no net loss of wetlands” policy is implemented, with an associated goal of net gain of wetlands through the restoration of previously degraded wetlands. The destruction or modification of wetlands is avoided. New construction in wetlands does not occur wherever there is a practicable alternative. The National Park Service compensates for unavoidable adverse impacts on wetlands by restoring wetlands that have been previously degraded.
Natural Resources: Wilderness	Wilderness characteristics and values are retained and protected. Visitors continue to find opportunities for solitude and primitive, unconfined recreation. Signs of people remain substantially unnoticeable.
Cultural Resources: Archeological Resources	Archeological sites are identified and inventoried, and their eligibility for listing in the National Register of Historic Places determined and documented. The qualities that contribute to the listing or eligibility for listing are protected in accordance with the <i>Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines</i> (Secretary of the Interior 1983) (unless it is determined through a formal process that disturbance or natural deterioration is unavoidable).  Archeological sites are protected in an undisturbed condition unless it is determined through formal processes that disturbance or natural deterioration is unavoidable. In such cases, the site is mitigated and professionally documented and excavated for data recovery. The resulting artifacts, materials, and records are curated and conserved in the park's museum collections and archives. Concurrence for mitigation is in consultation with the Texas State Historic Preservation Officer (and American Indian tribes, if applicable). Some archeological sites that can be adequately protected may be interpreted to the visitor.

Table 1. Desired conditions based on servicewide mandates and policies (continued)

Conditions to Be Achieved at Guadalupe Mountains National Park	
Topic	
Cultural Resources: Historic Structures	<p>Historic structures are inventoried and their integrity and eligibility are evaluated under National Register of Historic Places criteria. The qualities that contribute to the listing or eligibility for listing of historic structures in the National Register of Historic Places are protected in accordance with the <i>Secretary of the Interior's Standards for the Treatment of Historic Properties: with Guidelines for Preserving, Rehabilitating, Restoring &amp; Reconstructing Historic Buildings</i> (Secretary of the Interior 1995a) (unless it is determined through a formal process that disturbance or natural deterioration is unavoidable).</p>
Cultural Resources: Ethnographic Resources	<p>Appropriate cultural anthropological research is conducted in cooperation with groups associated with the park.</p> <p>The National Park Service accommodates access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoids adversely affecting the physical integrity of sacred sites.</p> <p>NPS general regulations on access to and use of natural and cultural resources in the park are applied in an informed, balanced manner that is consistent with park purposes, does not unreasonably interfere with American Indian use of traditional areas or sacred resources, and does not result in the degradation of park resources.</p> <p>American Indians and other individuals and groups linked by ties of kinship or culture to ethnically identifiable human remains, sacred objects, objects of cultural patrimony, and associated funerary objects are consulted when such items may be disturbed or are encountered on park lands.</p> <p>All ethnographic resources listed in the National Register of Historic Places or determined eligible for listing are called traditional cultural properties and are protected through tribal consultation. If disturbance of such resources is unavoidable, formal consultation with the Texas historic preservation officer and the Advisory Council for Historic Preservation, if necessary, and as appropriate with American Indian tribes, is conducted.</p> <p>The April 29, 1994, Presidential memorandum on "Government-to-Government Relations with Native American Tribal Governments," codified at 3 <i>Code of Federal Regulations</i> 1007 (1995), states in part, "Each executive department and agency shall consult, to the greatest extent practicable and to the extent permitted by law, with tribal governments before taking actions that affect federally recognized tribal governments. All such consultations are to be open and candid so that all interested parties may evaluate for themselves the potential impact of relevant proposals." Section 5.2.1 of <i>Management Policies</i> (NPS 2006) states in part that "traditionally associated peoples should be consulted about ... proposed NPS actions that may affect the treatment of, use of, and access to cultural and natural resources with known or potential cultural meaning for the groups."</p> <p>The identities of community consultants and information about sacred and other culturally sensitive places and practices will be kept confidential when research agreements or other circumstances warrant.</p>
Cultural Resources: Cultural Landscapes	<p>Cultural landscape inventories are conducted to identify landscapes potentially eligible for listing in the National Register of Historic Places, and to assist in future management decisions for landscapes and associated cultural and natural resources.</p> <p>The management of cultural landscapes focuses on preserving the physical attributes, biotic systems, and use when that use contributes to their historical significance. The preservation, rehabilitation, restoration, or reconstruction of cultural landscapes is undertaken in accordance with <i>The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes</i> (Secretary of the Interior 1995b).</p>



Table 1. Desired conditions based on servicewide mandates and policies (continued)

Conditions to Be Achieved at Guadalupe Mountains National Park	
Topic	
Cultural Resources: Museum Collections	All museum collections (objects, artifacts, specimens, and manuscript collections) are identified and inventoried, catalogued, documented, preserved, and protected. Provision is made for access to and use of items in the collections for exhibits, research, and interpretation. The qualities that contribute to the significance of collections are protected in accordance with established standards.
Visitor Use and Experience: Park Use Requirements	<p>Park resources are conserved “unimpaired” for the enjoyment of future generations. Visitors have opportunities for types of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources found in the park. No activities occur that would cause derogation of the values and purposes for which the park was established.</p> <p>For all zones, districts, or other logical management divisions within the park, the types and levels of visitor use are consistent with the desired resource and visitor experience conditions prescribed for those areas. Park visitors have opportunities to understand and appreciate the significance of the park and its resources, and to develop a personal stewardship ethic. To the extent feasible, programs, services, and facilities in the park are accessible to and usable by all people, including those with disabilities.</p>
Visitor Use and Experience: Commercial Services	All commercial services are authorized, are necessary and appropriate, and are economically feasible. Appropriate planning is done to support commercial services authorization.
Visitor Use and Experience: Public Health and Safety	Within the constraints of the Organic Act to not impair resources, and any other limitations on capability, the National Park Service and its concessioners, contractors, and cooperators seek to provide a safe and healthful environment for visitors and employees. The park staff strives to identify recognizable threats to safety and health and to protect property by applying nationally accepted standards. Consistent with mandates and the prohibition on impairment, the park staff will reduce or remove known hazards and/or apply appropriate mitigation measures, such as closures, guarding, gating, education, and other actions.
Other Topics: Sustainable Design and Development	<p>Visitor management facilities are harmonious with park resources, compatible with natural processes, aesthetically pleasing, functional, as accessible as possible to all segments of the population, energy-efficient, and cost-effective.</p> <p>All decisions regarding park operations, facilities management, and development in the park, from the initial concept through design and construction through operation and maintenance, reflect principles of resource conservation. Thus, all park developments and park operations are sustainable to the maximum degree possible and practical. New developments and existing facilities are located, built, and modified according to the <i>Guiding Principles of Sustainable Design</i> (NPS 1993) or other similar guidelines. Management decision-making and activities throughout the park use value analysis, which is mandatory for all Department of the Interior bureaus, to help achieve this goal. Value planning, also called value analysis, value engineering, and value management, is used when value methods are applied on general management and lower-tier planning activities.</p>

Table 1. Desired conditions based on servicewide mandates and policies (continued)

<b>Conditions to Be Achieved at Guadalupe Mountains National Park</b>	
Other Topics: Transportation to and within the Park	Visitors have reasonable access to the park. Connections exist from the park to regional transportation systems, as appropriate. Transportation facilities in the park provide access for the protection, use, and enjoyment of park resources. They preserve the integrity of the surroundings, respect ecological processes, protect park resources, and provide high visual quality and a rewarding visitor experience. The National Park Service participates in all transportation planning forums that may result in links to the parks or impacts on park resources. This may involve working with federal, tribal, state, and local agencies on transportation issues to address park access and transportation connectivity.
Other Topics: Utilities and Communication Facilities	Park resources or public enjoyment of the park are not denigrated by nonconforming uses. Telecommunication structures do not jeopardize the park's mission and resources. No new nonconforming use or rights-of-way are permitted through the park without specific statutory authority and approval by the director of the National Park Service or his representative, and are permitted only if there is no practicable alternative to such use of NPS lands.

The desired conditions identified in Table 1 are qualitative statements. The target values included in Table 6 attempt to further characterize and quantify these qualitative statements by assigning numerical standards or targets for resource condition.

Table 2. Desired conditions by management zones identified in the Draft Guadalupe Mountains General Management Plan

Management Zone	Designated Wilderness	Backcountry	Wilderness Threshold	Frontcountry	Developed	Motorized Scenic Corridor
<b>Resource Condition or Character</b>	In these undisturbed natural settings, natural processes predominate. Visitor access and use improvements are primitive or absent. Significant cultural resources could be present and, as appropriate, are stabilized and preserved.	These lands are eligible for future consideration as wilderness, but have not been so designated by Congress. Resource character and condition are the same as designated wilderness.	Minimally disturbed natural settings are managed for a low level of human intervention and development. Significant cultural resources are stabilized and preserved as necessary.	Lands are natural in appearance with a moderate level of human intervention and development. Natural systems could be modified. Significant cultural resources are preserved or rehabilitated for operational or visitor use.	The landscape includes natural features, but is highly modified and managed for visitor use. Significant cultural resources are preserved or rehabilitated for operational or visitor use.	This zone applies to vehicular corridors which pass through natural settings. Land within this zone has been moderately to highly modified.

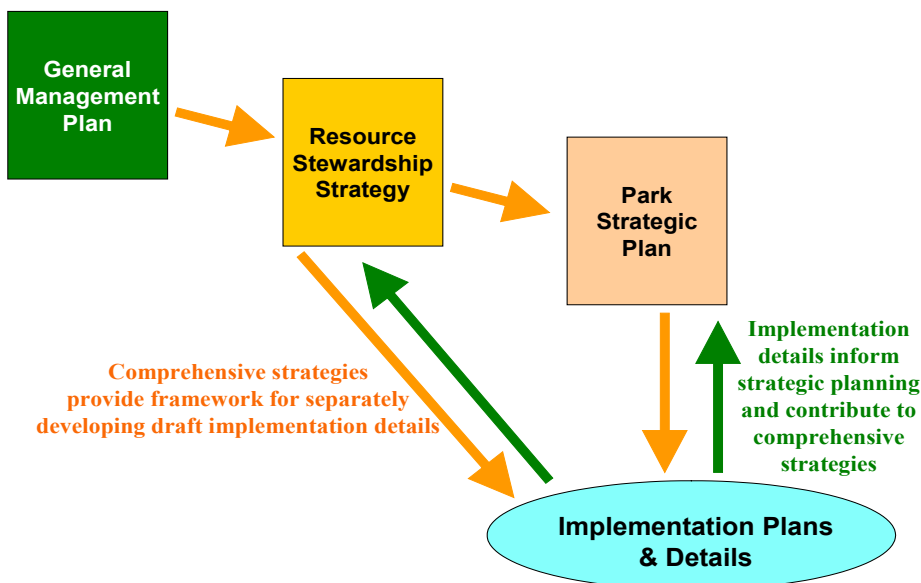
## RELATIONSHIP OF THE RESOURCE STEWARDSHIP STRATEGY TO OTHER PARK PLANS

The resource stewardship strategy is a program plan as defined in NPS *Management Policies 2006*. Program management planning for a park provides a bridge between the broad direction provided in a park's general management plan and specific actions taken to achieve goals. These plans provide a comprehensive approach for a single park program area across all or most of the park. Examples of other program plans at Guadalupe Mountains include the backcountry/ wilderness management plan, resource management plan, land protection plan, and comprehensive interpretive plan. Program management plans provide comprehensive recommendations about specific actions needed to achieve and maintain the desired resource conditions and visitor experiences. The resource stewardship strategy is intended to replace the park's *Resource Management Plan*.

Park-level strategic planning remains a critical step in decision making by park management involving the allocation of park financial and human resources. While the management plan describes the desired conditions that are to be ultimately achieved for the park, the park's 5-year plan and annual performance plans describe what realistically can be achieved based on foreseeable financial and human resources. Figure 5 illustrates the relationship among these types of plans.

The resource stewardship strategy presents 10- to 20-year comprehensive strategies to provide a logical, very long-term investment in achieving and maintaining desired conditions. The activities comprising these comprehensive strategies inform the sequence, duration, and association between more detailed recurring and non-recurring implementation actions that would be considered during park strategic and implementation planning.

Figure 5. Role of the resource stewardship strategy in park planning



The park already possessed a number of implementation plans at the time this resource stewardship strategy was developed. Where appropriate, information included in these implementation plans has been incorporated into this resource stewardship strategy. A summary and review of planning documents associated with or affected by the resource stewardship strategy is included in Table 3.



**Table 3.** Summary of existing park plans

Type of Plan/Plan Title	Status (Complete, Incomplete, In Process, Ongoing)	Notes
<b><i>General Management Plan and Related Documents (15-20 years)</i></b>		
Wilderness Eligibility Assessment	Complete, 2008	Included in the Draft GMP
General Management Plan	In Process	Draft GMP/EIS completed in February 2008; to be finalized in 2009
Foundation for Planning and Management	Incomplete, July 2007	Identified and described fundamental and other important resources and values; did not complete analysis or prepare as a standalone document
<b><i>Program Management Plans (Approx. 15-20 years)</i></b>		
Resource Stewardship Strategy	In Process	To be completed in spring 2009
Comprehensive Interpretive Plan	Complete, 2006	Reviewed April 2007
Backcountry/Wilderness Management Plan	Complete, 1995	Needs revision
Museum Collections Management Plan	Complete, 1994	Needs revision
Resource Management Plan	Complete, 1992 (with 1995 update)	RMP will be retired upon approval of the resource stewardship strategy
Land Protection Plan	Complete, 1992	Needs revision
Cave Management Plan	Complete, 1991	Needs revision
<b><i>Strategic Plans (1-5 years)</i></b>		
Park Strategic Plan (2007-2012)	Complete, 2007	Needs revision in 2010
Annual Performance Plan	Complete, 2007	Needs annual revision
<b><i>Implementation Plans (variable timeline)</i></b>		
Trail Management Plan	In Process	To be completed in summer 2009
Sand and Gravel Management Plan	Complete, 2007	Revise as needed
Fire Management Plan	Complete, 2005	Comprehensive review in 2010
Integrated Pest Management (IPM) Plan	Complete, 2000	Needs revision

## RELATIONSHIP OF THE RESOURCE STEWARDSHIP STRATEGY TO OTHER PLANS AND PROGRAMS

This resource stewardship strategy is related to a variety of other existing plans and programs. Table 3 includes a listing of these plans. In many cases, plans such as the comprehensive interpretive plan, fire management plan, land protection plan, or the integrated pest management plan are critical to the implementation of this RSS. Programs, such as the NPS Inventory & Monitoring Program (I&M Program) initiated through the Natural Resource Challenge, also play an important role and connection to the resource stewardship strategy. The I&M Program uses a “network approach”: parks are grouped with other parks that have similar ecosystems. Guadalupe Mountains National Park is part of the Chihuahuan Desert Network (CHDN), along with Carlsbad Caverns NP, Big Bend NP, White Sands NM, Ft. Davis NHS, Rio Grande WSR, and Amistad NRA. The CHDN has completed Phases I and II of their Vital Signs Monitoring Plan. The Vital Signs Monitoring Plan responds to a requirement in the 1998 National Parks Omnibus Management Act that the National Park Service conduct long-term inventory and monitoring of park resources. Phases I and II included gathering and assessing existing information, and developing a conceptual ecosystem model and vital signs. The third and final phase is currently in process and will contain the details needed to implement monitoring, including monitoring protocols for selected vital signs and statistical sampling designs. The Phase III final report is expected in September 2008.

**Vital Signs Monitoring.** The core of the I&M program is the monitoring of “Vital Signs.” The Servicewide goals of the Vital Signs program include the following:

1. Determine status and trends in selected indicators of the condition of park ecosystems to allow managers to make better informed decisions and to work more effectively with other agencies and individuals for the benefit of park resources.
2. Provide early warning of abnormal conditions and impairment of selected resources to help develop effective mitigation measures and reduce costs of management.
3. Provide data to better understand the dynamic nature and condition of park ecosystems and to provide reference points for comparisons with other, altered environments.
4. Provide data to meet certain legal and congressional mandates related to natural resource protection and visitor enjoyment.
5. Provide a means of measuring progress towards performance goals.

The Vital Signs program will need to be complimented by additional monitoring (either performed by park staff or cooperators) to carry out the RSS.

*The CHDN has identified 23 vital signs to be monitored within network parks. Four vital signs refer to air quality, two refer to climate, two to focal species, one to invasive plants, four to landscape condition and dynamics, five to soils and vegetation, and five to water quality and quantity. Eighteen vital signs will be monitored with CHDN funds. Air quality and climate vital signs will be monitored with national program funds. CHDN is in the process of developing monitoring protocols for the 18 selected vital signs. Protocols are peer-reviewed, revised as necessary, and given final approval from the Intermountain Region Monitoring Coordinator. Development of monitoring protocols was initiated in FY2009. Monitoring protocol development is a multi-year process, with final approvals expected between FY2010 and FY2012.*

## **Other Programs**

A number of other programs contribute to, or are influenced by, the RSS. For example, a variety of condition assessments provide information that inform and can be integrated into the RSS. Condition assessments for cultural resources include: CLI, LCS, ANCS+, ASMIS, and FMSS. Condition assessments for natural resources include: Vital Signs, and Natural Resources Condition Assessment (funded and managed by NRPC's Water Resources Division). Strategic and implementation planning is influenced by the strategies that are included in the RSS and can directly support the development of PMIS and OFS requests. The RSS strategies can be used to support the development and refinement of annual work plans. Data obtained from indicator monitoring should also support reporting to GPRA goals.

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## DESCRIPTION OF THE PARK'S RESOURCES

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### OVERVIEW

Guadalupe Mountains National Park was authorized by an act of Congress (Public Law 89-667) in 1966. The stated goal was to preserve “an area possessing outstanding geological values together with scenic and other natural values of great significance.” The park was formally established in 1972 with 76,293 acres.

In 1977, the park was designated a Class I air quality area under the Clean Air Act. As a result, the park receives the highest level of protection under the Act and NPS has “an affirmative responsibility” to protect air quality sensitive resources in the park, including vegetation, soils, waters, wildlife, and visibility (42 U.S.C.7475(d)(2)(B)). Air pollution sources with the potential of affecting park resources must meet stringent emissions controls standards and only a very small additional amount of pollution is permitted in the area. The Act also set a goal of preventing any future, and remedying any existing, impairment of visibility in Class I areas from manmade air pollution.

In 1978, 46,850 acres of the park’s backcountry were formally designated by Congress as wilderness. This action was authorized by Public Law 95-625, the National Parks and Recreation Act of 1978.

On October 28, 1988, Congress passed legislation (Public Law 100-541, 102 Stat. 2720) that enlarged the park by 10,123 acres. The new land included gypsum and quartzose dunes in an area west of and adjacent to the park boundary. All of the land identified in the 1988 legislation was deeded to the National Park Service except 226 acres owned by The Nature Conservancy.

Today, Guadalupe Mountains National Park includes 86,416 acres in west Texas, just south of the New Mexico border and north of U.S. Highway 62/180. The Guadalupe Mountains rise more than 3,000 feet from the arid Chihuahuan Desert that surrounds them. El Capitan, the park’s most striking feature, is a 1,000-foot-high limestone cliff. Nearby Guadalupe Peak, at 8,749 feet above sea level, is the highest point in Texas.

The Guadalupe Mountains are part of a 400-mile-long horseshoe-shaped, fossilized reef formation, called the Capitan Reef, that extends through a large area of west Texas and southeastern New Mexico. Most of the reef formation is buried. The longest exposed stretch of the Capitan Reef extends from Guadalupe Mountains National Park northeast nearly to the city of Carlsbad, New Mexico. This 260-270-million-year-old formation is one of the world’s finest examples of an ancient marine fossil reef. The reef’s fossil-bearing strata are also associated with the rich “oil patch” of west Texas.

Three internationally significant geological stratotype sections are found in the park. Stratotypes are outstanding examples of exposed rock that represent a certain period of geologic time.

The Guadalupe Mountains have a cultural history that includes native peoples and successive waves of explorers, travelers, and immigrants. Although Spanish explorers passed through the area in 1692, the arid desert and remote highlands of the Guadalupe Mountains were the domain of native Mescalero Apache people until the mid-1800s. Gradually, explorers and pioneers entered the area and navigated by the distinctive landmark of the Guadalupe. The Butterfield Stagecoach began carrying mail and passengers through the Guadalupe Mountains on the nation’s first transcontinental mail route in 1858.



Settlers developed ranches around the Guadalupe Mountains in the mid-1800s, leading to periodic conflicts with the Mescaleros. During the Army's military campaign against the Mescaleros, the high country of the Guadalupe Mountains became one of the Mescaleros' last sanctuaries. By 1880, the majority of the Mescaleros were no longer occupying the Guadalupe Mountains region.

Subsequent years brought more ranchers to the area. In the 1920s and 1930s, J.C. Hunter consolidated the ranches into one large holding. Hunter built structures and an extensive livestock-watering system that pumped spring water from the southeast lowlands to the high country.

Wallace Pratt, a petroleum geologist who was charmed by the Guadalupe Mountains, bought land in McKittrick Canyon in the 1930s and built two residences that still remain. In 1959, Pratt donated his land to the National Park Service. Adjacent lands owned by Hunter and others were eventually purchased and combined into the new Guadalupe Mountains National Park.

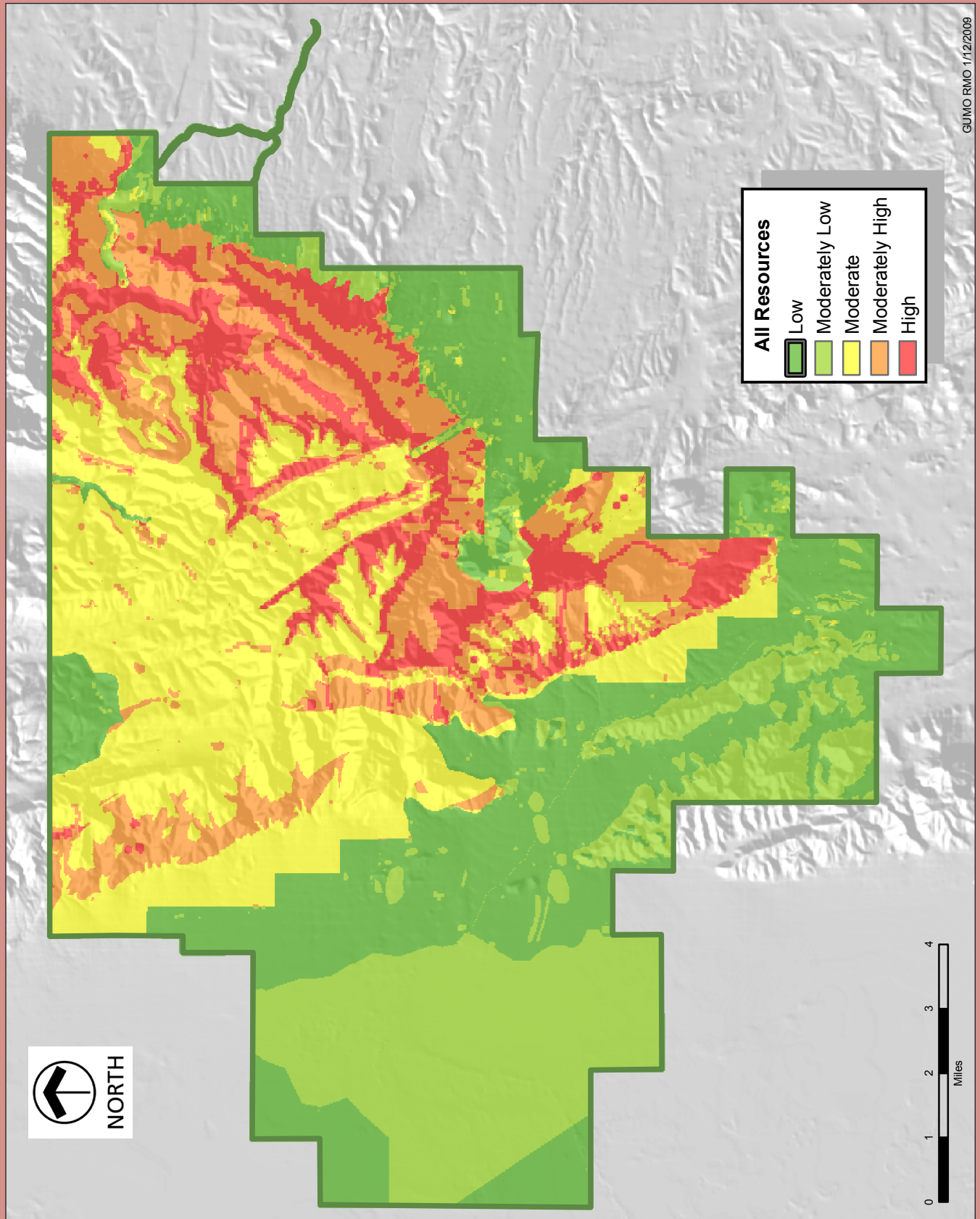
The Draft GMP contains a thorough description of the park's resources in the "Affected Environment" section. Excerpts from that section are included below for each of the major resource categories that were the subject of the resource stewardship strategy. The existing conditions of park development are shown in Figure 3.

Figure 6 displays the relative concentration of all documented park resources including natural, cultural, legislated wilderness, and proposed wilderness.



Aerial View of  
El Capitan and  
Pine Springs.  
NPS Photo.

Figure 6. Relative concentration of natural and cultural resources



## **GEOLOGICAL RESOURCES**

### **Soils**

Soils differ considerably as a function of elevation and aspect in the Guadalupe Mountains. In general, soils are very thin to absent, calcareous, and are poorly developed. The shallow soils tend to be held in place by rock cover, which also defends against erosion and keeps moisture from escaping. All soils in the park are highly susceptible to loss by wind and water erosion after they have been disturbed or exposed.

As elevation increases, more leaching of calcium carbonate is evident. Soils at higher elevations also become more clay based, exhibit evidence of clay translocation, contain more organic carbon, and become less dry.

Thicker soils in the Salt Basin are highly alkaline (gypsiferous), and can support only a few, highly adapted plants. Cryptobiotic soils are common in the alkaline environment where gypsum sand dunes have become stabilized.

Cryptobiotic soils are living soil crusts that are dominated by cyanobacteria (formerly called blue-green algae), but that also include lichens, mosses, green algae, micro-fungi, and bacteria. These crusts play an important role in natural ecosystems. These bacteria also are important because of their ability to convert atmospheric nitrogen to a form that plants can use, and their capacity to intercept and store water. Both characteristics are especially important in desert ecosystems (like the Guadalupe region) where nitrogen levels are low and water is scarce. The extent, variety, and resiliency of the cryptobiotic crusts have not been fully mapped or inventoried in the park. Staff have observed natural healing of park soil crusts disturbed by vehicles or livestock within a 10-15 year period.

Many human activities are incompatible with the presence and well-being of cryptobiotic soils. The “fibers” that give the crusts their strength are crushed by footprints or machinery. Vehicle or bicycle tracks are especially damaging, creating areas that are vulnerable to wind and water erosion, and rainfall carries away loose material, often creating channels along these tracks. Wind also blows pieces of the pulverized crust away, transporting the underlying loose soil, and often covering the nearby crusts. Burial can mean death because crustal organisms need light to photosynthesize. When crusts overlying large sandy areas are physically disturbed during dry periods, previously stable areas can become a series of shifting sand dunes in just a few years. Under ideal circumstances, a thin veneer of cryptobiotic soils may return in five to seven years, but in some disturbed areas, damage to the sheath material and the accompanying loss of soil nutrients result in a recovery period of 50 years or more.

### **Geology**

The Guadalupe Mountains are one of the finest examples of an ancient fossil reef on Earth. Geologists from around the world come to the park to study this extraordinary natural phenomenon. Between 260 and 290 million years ago, during the Permian Period of geologic time, a large, tropical sea containing various life forms covered portions of Texas and New Mexico. Over millions of years, calcareous sponges, algae, and other lime-secreting organisms combined with vast quantities of lime precipitated directly from seawater to form the 400-mile long, horseshoe-shaped Capitan Reef. Eventually the sea evaporated, and a thick blanket of sediments and mineral salts filled the basin and buried the reef. The reef was entombed for hundreds of millions of years until about 20 to 30 million years ago, when uplift from major regional faulting exposed a part of the fossil reef and formed the Guadalupe Mountains.

Major outcrops of reef deposits occur in McKittrick Canyon and the classic geologic exposures along the western escarpment. The extensive exposures of the Permian reef are considered by geologists and paleontologists throughout the world as an outdoor laboratory of unique importance for investigating scientific principles; tracing the history



of the earth; and understanding the origins of certain valuable mineral resources such as petroleum, potash, dolomite, and limestone. The reef rocks and adjacent permeable deposits form the main body of the Capitan Reef aquifer, which supplies water across a large area from Carlsbad, New Mexico to the Midland-Odessa area of Texas.

*Geology of the Western Escarpment.* The park's western escarpment has played an important role in revealing the story of the Permian Period in North America. These exposures are almost a mile thick and present one of the finest cross-sections of rocks in the world, showing complete lateral transitions from shallow-water marine deposits to deep-water marine deposits. Specifically, the abrupt changes in rock types reflect sediment deposition in shallowly submerged areas, on wave-built shoals, on the crest of the barrier reef, down the reef face, and in the cold, dark waters of the deep sea basin.

Geologists have intensively studied exposures on the lower section of the western escarpment, and numerous stratigraphic *type sections* are designated in this area. A *type section* serves as the defining unit to which all other rocks of similar age and composition can be compared. These exposures are carefully managed for preservation so that geologists can continue to study and learn about this ancient fossil reef and to provide continued enjoyment by the general public.

*Stratotypes.* Three localities in the park were recently designated as *global stratotype sections*. Global stratotype sections are *type sections* of international significance and are designated for having the world's best geological and paleontological record of any rock of its age.

The park's three global stratotype sections are formal international reference standards for the middle Permian Period of the geologic time scale. The middle Permian Period is now known worldwide as the Guadalupian Series and is named for the Guadalupe Mountains. This time interval is based on the presence of certain evolutionary transitions of fossil conodonts (microscopic teeth of an extinct marine vertebrate).

*Gypsum Dunes.* The white sands of the gypsum dunes rise up to 100 feet from the desert floor and provide a brilliant contrast to the dark, towering rock face of the Guadalupe Mountains. To the west are barren salt flats that are responsible for creating these beautiful dunes. As rain-water runs off the highly soluble limestone rocks that surround the area, salts are leached. When this runoff accumulates on the flats of the desert basin and evaporates, large grains of these salts are left behind. The wind carries the sand grains northeast toward the western escarpment of the Guadalupe Mountains. The air currents rising up over the mountains deposit the white sediments that form the gypsum dunes. Because of their isolated location and the harsh conditions of the surrounding environment, the gypsum dunes have remained largely undisturbed throughout the years. The Nature Conservancy purchased a portion of the site in 1980 and has managed it as a nature preserve since that time.

Today, this small portion (226 acres) remains a private inholding in the park, but it is managed under a cooperative agreement between the Hudspeth Directive for Conservation, The Nature Conservancy, and the National Park Service as an integral part of the Salt Basin Dunes. The Nature Conservancy retains a conservation easement. The intent is to eventually transfer the 226-acre inholding to the National Park Service.

*Caves.* Caves in the Guadalupe Mountains are known worldwide for their large chambers and total volume; spectacular speleothem deposition of rare form, size, or beauty; joint controlled development; vertical drops of up to several hundred feet; and rare mineralogy that has resulted from upwelling of sulfur solutions, evaporation, and presence of magnesium in fore-reef and back-reef dolomites. Unfortunately, this is not true for the caves found in Guadalupe Mountains National Park. Because of the geological processes and uplifting that has occurred in the area, park caves are characterized by vertical shafts,



poor chamber development, and fewer formations than are found throughout the rest of the Guadalupe Mountain range. To date, 25 caves have been identified in Guadalupe Mountains National Park.

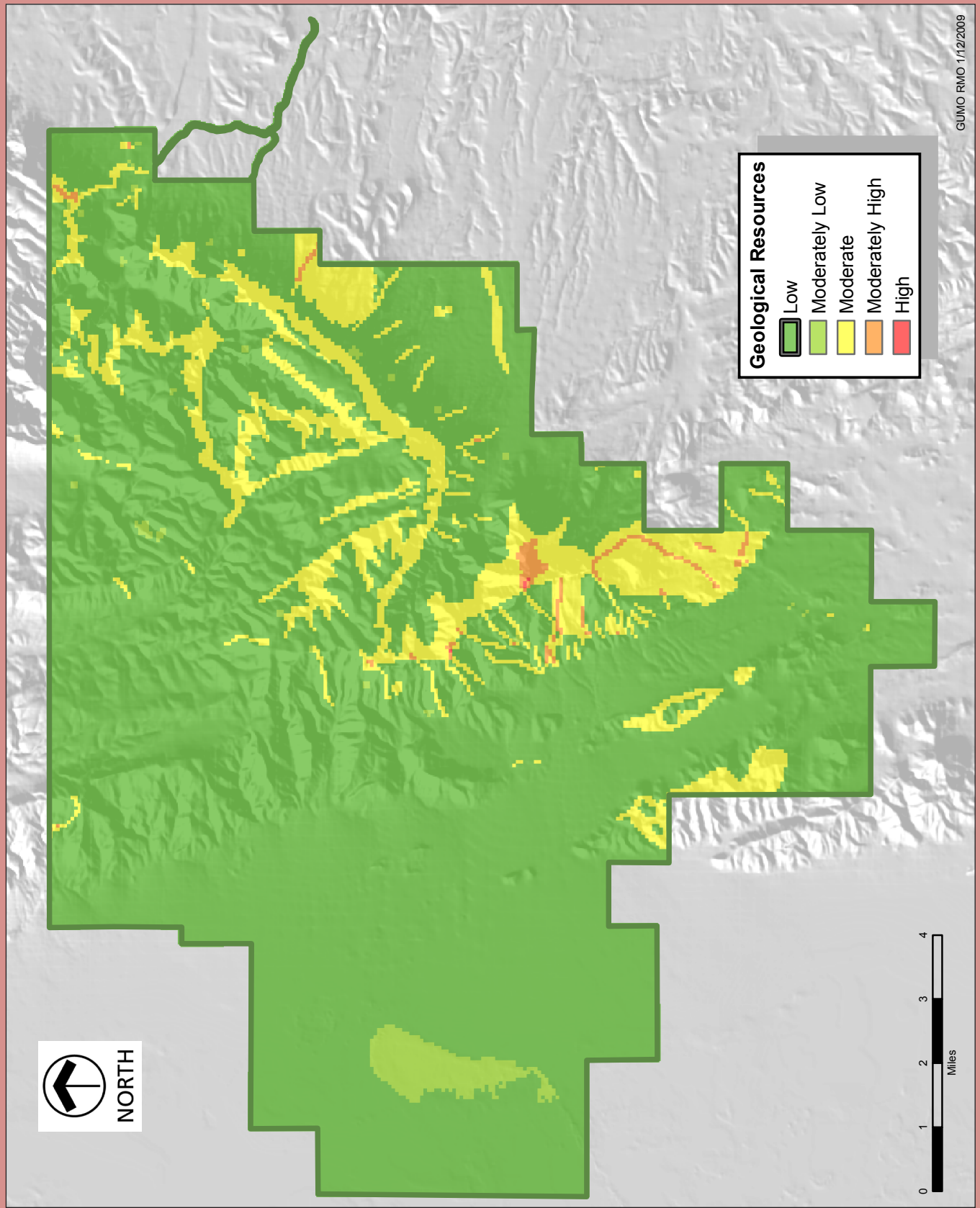
Recreational use of caves in the park is quite low, with very few access permit requests. This is probably because of the proximity of more well-known, more highly developed and decorated caves in Carlsbad Caverns National Park, within the Lincoln National Forest, and on Bureau of Land Management lands. In addition, most caves in the park are difficult to access, requiring a hike of up to several hours over rough terrain. Caves in the park contain important habitat for populations of cave-dwelling or cave-using animals, including bats.

Figure 7 displays the relative concentration of geological resources including reef facies, oil wells and mines, global stratotypes, geological type areas, published measured sections, interpreted trails, caves, and dune features.

Western Escarpment.  
NPS Photo.



Figure 7. Relative concentration of geological resources





## PALEONTOLOGICAL RESOURCES

### Fossils

The Guadalupe Mountains of Texas and New Mexico contain the world's largest surface exposure of a Permian-aged reef. Permian fossils are most common in the reef and reef slope deposits of the Capitan Formation and in the eight limestone tongues found in the Cherry Canyon and Bell Canyon formations. The greatest concentration of fossil diversity is in the Capitan Reef and reef slope deposits. Every geological formation in the park contains fossils, and fossils are visible on almost every mile of the park's 82 miles of hiking and nature trails.

At least 22 type fossil localities occur in the park, with more to be added as a literature survey progresses. The total number of fossil species occurring in the park is estimated to be between 800 and 1,200, but a complete census is not available and that figure may be low. Fossils of the Permian Period include representatives of most invertebrate phyla as well as 20 to 40 species of fossil fish, including sharks.

Using information from publications and geologic maps, it is estimated that 27,000 (31 percent) of the park's 86,416 acres have high potential to produce fossil materials.

### Fossils in Caves

Caves in the park have provided 106 different species of Pleistocene animal and plant fossils. Four park caves contain the world's largest concentration of extinct fossil ground sloth dung deposits, which provide a rich sampling of the local flora occurring here at the end of the Ice Age. Ninety-four sub-fossil vertebrate taxa dated between 1,400 and 2,800 years before present were found in one cave. Fossil packrat middens were found in four caves, providing additional sampling of prehistoric Quaternary floras and faunas.

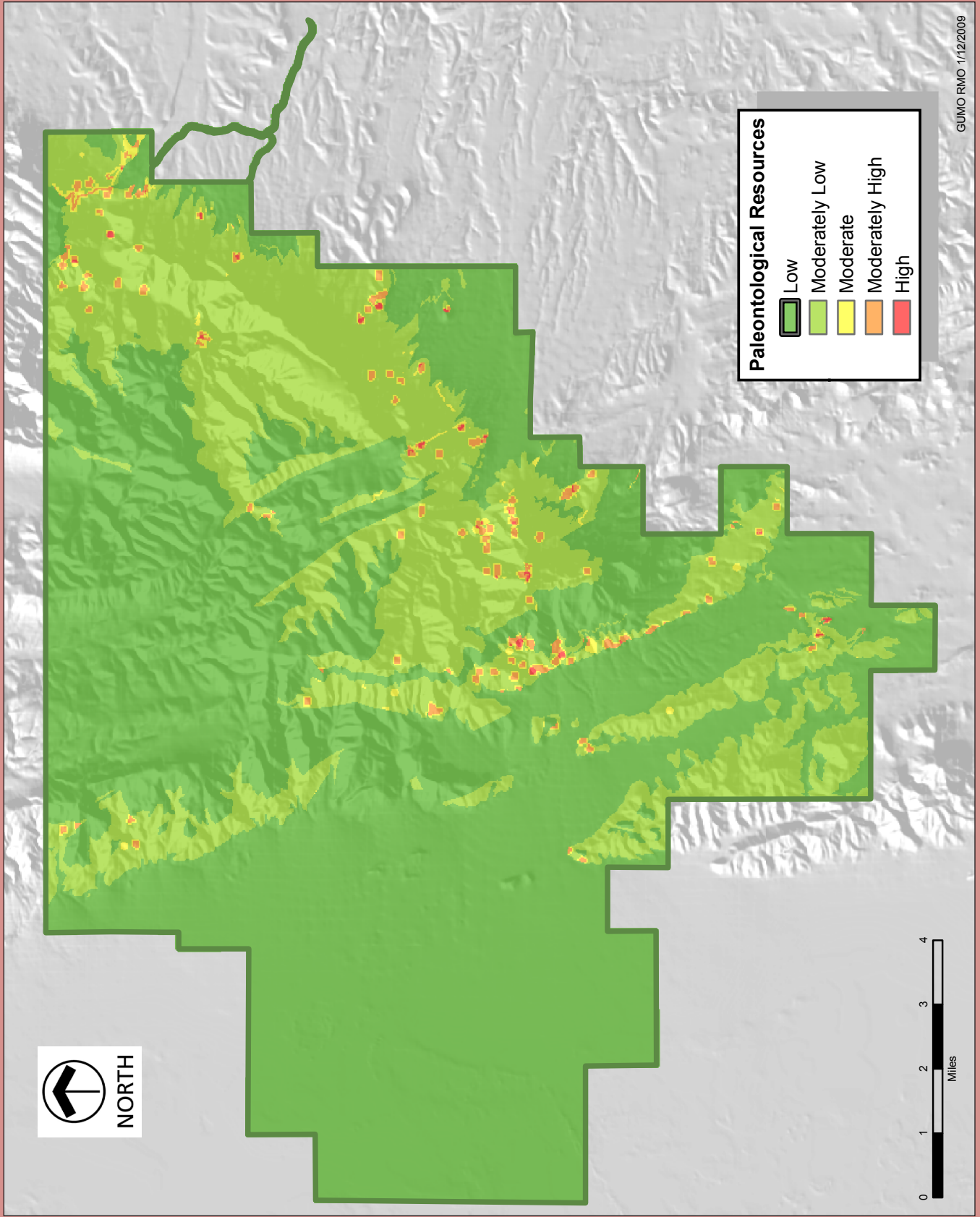
Several caves contain paleontological deposits or cultural sites. There are intact or partially intact vertically stratified paleontological deposits in at least five caves. Two containing human remains will soon be converted to Native American Graves Protection and Repatriation Act sites, according to consultations with affiliated tribes.

Figure 8 displays the relative concentration of paleontological resources including areas of high paleontological potential, known paleontological sites, published localities, critical specimens, and critical points of paleoecological value.

Permian Reef Trail.  
NPS Photo.



Figure 8. Relative concentration of paleontological resources





## SCENIC RESOURCES

The park's primary scenic vistas and features are described in the "Fundamental Resources and Values" section. Although the park's Chihuahuan Desert location shapes the local climate, other influences are apparent:

- The northern portions of the park in Dog Canyon are cooler and moister, reflecting a climate more like the Great Basin.
- Eastern portions of the park have Great Plains connections.
- The higher elevations can be classified as an isolated extension of the Rocky Mountains.

The lower elevations of Guadalupe Mountains National Park consist of mostly sparsely vegetated Chihuahuan Desert and rolling foothills. Within this setting, the up-lifted Permian reef forms a huge, V-shaped escarpment. The uplift creates a "sky island" in the midst of the desert, in which rests the Bowl, an area of relict forests that provide mostly mixed conifer habitat. El Capitan, on the southern end of the escarpment, is a prominent park landmark that is visible for more than 90 miles. The impressive escarpment extends northwest from El Capitan and contains other distinctive peaks, including the 8,749-foot-high Guadalupe Peak, the highest point in Texas. The next three highest peaks in Texas, all of which exceed 8,000 feet above sea level, also are in the park. The base of the western escarpment is 3,650 feet in elevation, some 5,100 feet lower than Guadalupe Peak.

The high country's major scenic and scientific features are not visible from the desert floor. The high country's features include the following:

- A distinctive area of relict forest includes ponderosa pine, southwestern white pine, Douglas-fir, and a small grove of aspen.
- The Bowl, which is in the center of the 45,000-acre high country forest, provides mixed-conifer habitat.
- McKittrick Canyon extends out of the high country and through the eastern escarpment. Its south arm possesses special scenic appeal and scientific importance because of its unique geology and biotic communities.

Figure 9 displays the relative importance of park viewsheds based on three observational datasets (viewshed groups): 1) circa 1940 drawings, 2) points with high scenic views inside and outside park boundary, and 3) views from transportation corridors.

### Air Quality and Related Resources

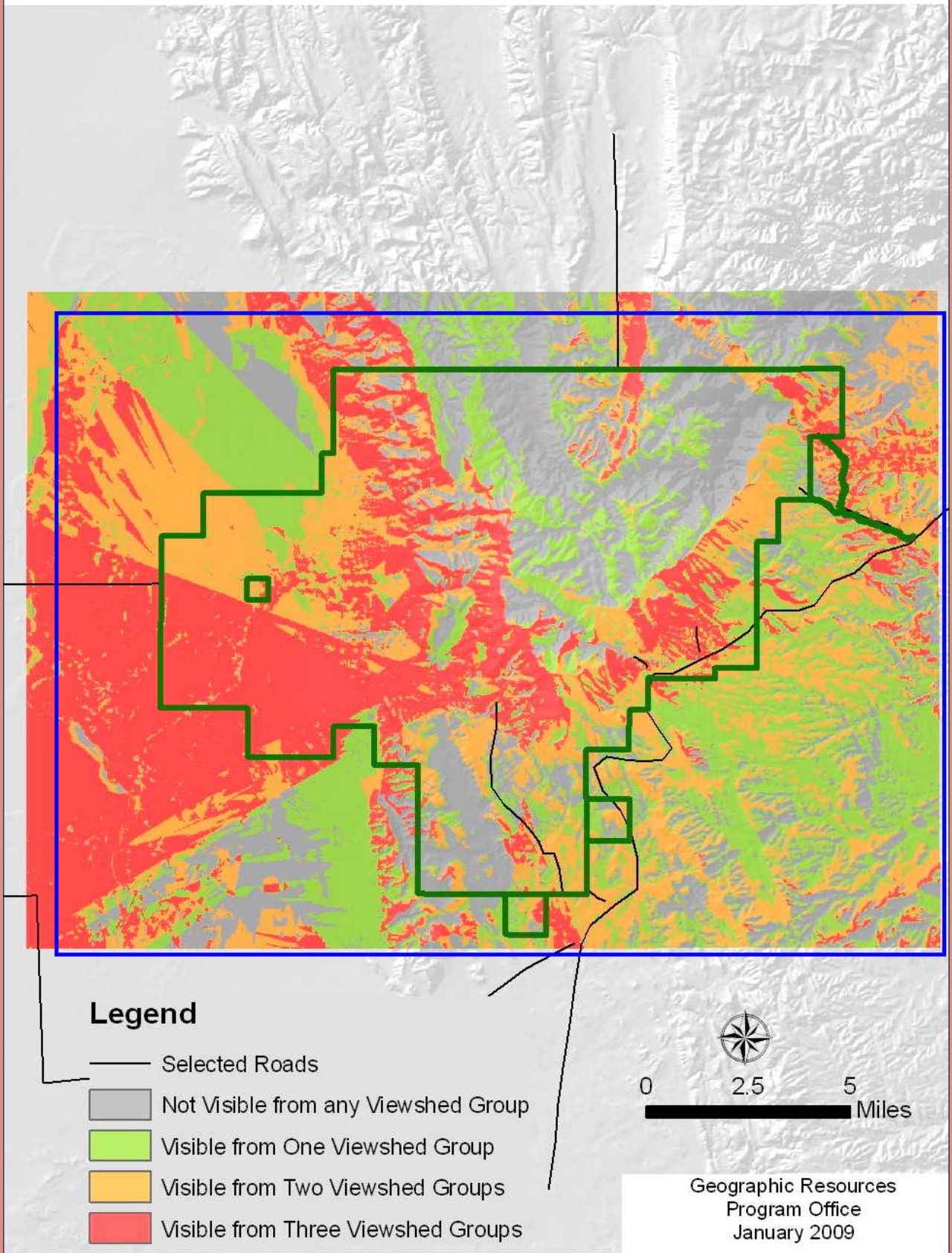
Although Guadalupe Mountains NP is a Class I air quality area, air quality in the park is sometimes degraded. Air pollutants, including fine particles, ozone, and sulfur and nitrogen compounds can be transported into the park, causing haze or depositing to soils, vegetation, and waters.

The Bowl.  
NPS Photo.



# Combined Viewshed

Figure 9. Viewshed analysis (Source: IMRO Geographic Resources Program Office, 2009)





## Visibility

At present, visibility has been identified as the most sensitive air quality related resource in the park and has been monitored since 1988; other resources may also be very sensitive, but have not been sufficiently studied. Visibility includes not only how far you can see, but how well you can see (i.e., color, form, contrast detail). Although visibility in the park is still superior to that in many parts of the country, visibility in the park is often impaired by light-scattering pollutants (haze). Haze is composed of sulfate, nitrate, ammonium, carbon, and organic fine particles and comes from a variety of natural and anthropogenic sources, including vehicles, powerplants, agricultural activities, industry, and fires.

## Vegetation

Vegetation in the park may be affected by ozone or nitrogen compounds deposited directly to plants or to soils or waters. Ozone may cause either visible foliar injury or decreased growth and reproduction in sensitive plant species. Plant response depends on variables including ozone concentrations and cumulative doses, climate, soil moisture, and plant genotype. A 2004 assessment concluded that the risk of visible ozone injury to vegetation in the park was relatively low because ozone concentrations and long-term exposures are relatively low, and soil moisture is often low, precluding plant uptake. However, several ozone-sensitive plant species occur in the park, including *Pinus ponderosa* (ponderosa pine) and *Rhus trilobata* (skunkbush), and sensitive species may be impacted if ozone concentrations increase.

Vegetation may also be affected by atmospheric deposition of nitrogen compounds. Nitrogen is a fertilizer and may induce enrichment of terrestrial ecosystems or eutrophication of aquatic ecosystems. While beneficial to crops and some forests, nitrogen can cause detrimental effects in natural ecosystems that have evolved under low nitrogen conditions, have short growing seasons and sparse vegetation. These systems, typical of much of the park, have little capacity to assimilate excess nitrogen. Certain plant species, including invasive grasses, are able to take advantage of the extra nitrogen, increasing at the expense of native species, reducing biodiversity. By increasing overall plant biomass, nitrogen may also increase fire risk.

## Surface Waters and Soils

Surface waters and soils in the park are likely to be well-buffered by cations like calcium and magnesium and, as a result, insensitive to acidic atmospheric deposition. Nitrogen deposition, because of its fertilizing effect, may alter nutrient cycling in soils, or cause eutrophication of waters.

## NATURAL RESOURCES

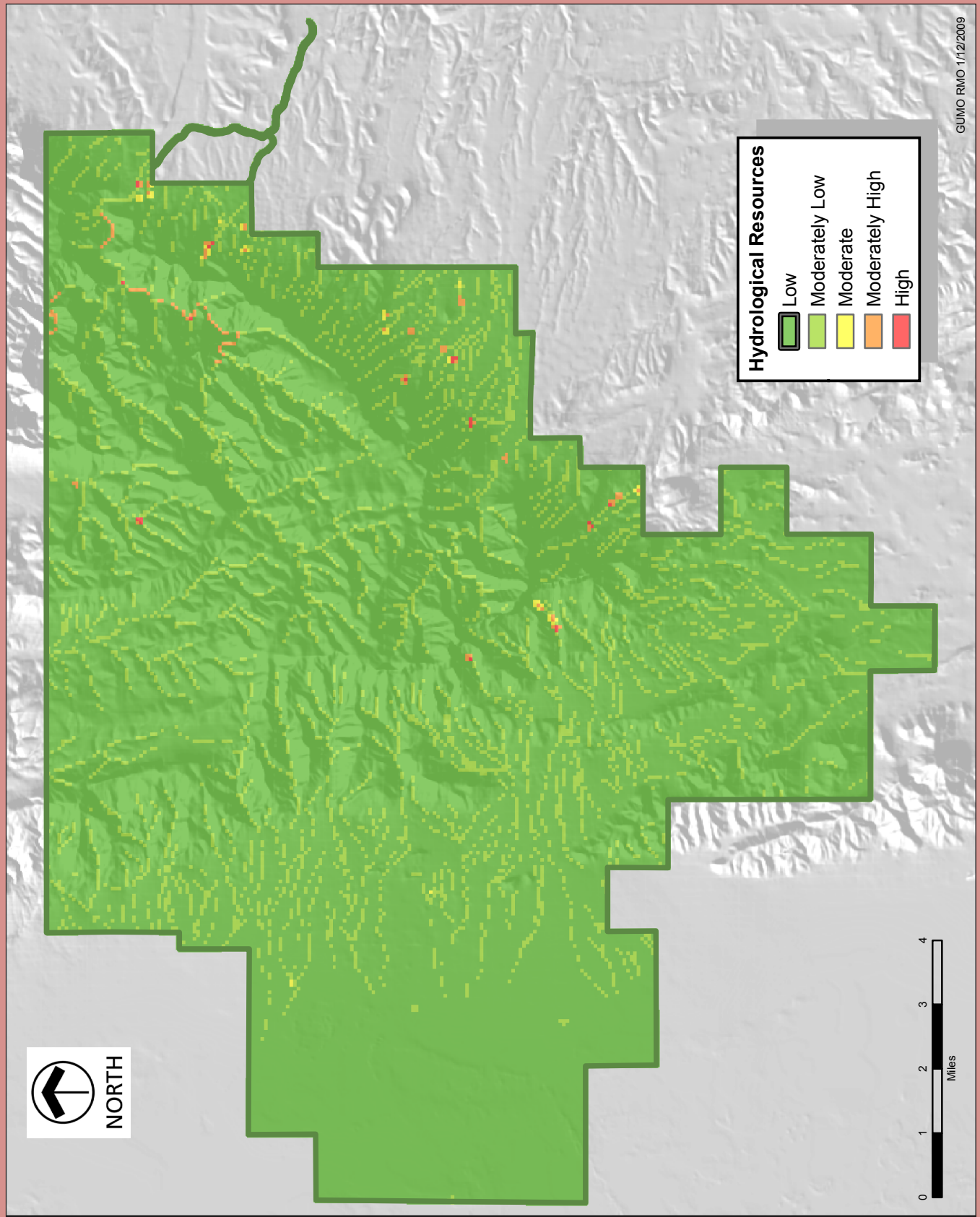
### Hydrology

Most of the water sources of the Guadalupe Mountains originate in the upper mountainous regions and appear as springs and seeps at the base of the escarpments. Springs and tributaries between mountain peaks and ridges are few.

Cuts created through the rock layers by flowing water allow ground waters to drain into the canyons. Depending on rainfall, there can be numerous springs and seeps. However, most streams are intermittent because of the permeability of the strata. Only nine permanent springs have been identified within Guadalupe Mountains National Park.

The park includes two perennial streams: Choza and McKittrick. Choza is a spring-fed stream that runs along the surface for 1 to 1.5 miles. McKittrick Creek is a unique aquatic ecosystem. It is a small, discontinuous, spring-fed stream that runs for 7.7 miles in McKittrick Canyon. The principal direction of flow is easterly, cutting through the Permian limestone of the Guadalupe escarpment where the surface flow ends. Travertine deposits seal the bed and keep flow on the surface for much of the length of the canyon.

Figure 10. Relative concentration of water resources





Portions of both McKittrick and Choza Creeks are officially designated as Ecologically Unique River & Stream Segments by the State of Texas (Texas Water Development Board). The Far West Texas Regional Planning Group has identified nine Major Springs in the park. Under Texas Water Development Board guidelines, a Major Spring is important for water supply or natural resource protection purposes. Included in this management category are, in alphabetical order, Bone Spring, Dog Canyon Spring, Frijole Spring, Goat Seep, Guadalupe Spring, Juniper Spring, Manzanita Spring, Smith Spring, and Upper Pine Spring.

Figure 10 (page 41) displays the relative concentration of hydrological resources including permanent and ephemeral water courses, springs and seeps, and active water well

### **Plant Communities and Vegetation Types**

The park is in a vegetative transition zone where east meets west, and some plants found in the Rocky Mountains are at their southernmost geographic limits. The mountains form a biological “island” that is surrounded by the northern Chihuahuan Desert and provides diverse plant communities. More than 1,000 species of plants have been recorded in the park, including 37 plant species of special concern. Of these, 16 are endemic to the Guadalupe Mountains.

Depending on the elevation and exposure, vegetation types in Guadalupe Mountains National Park include desert scrub, grasslands, chaparral, woodlands, and coniferous forest. Striking desert succulents, canyon fall color, and high-country conifers are all part of the park’s appeal. The fall displays of western hophornbeam and bigtooth maple are particularly attractive. The only known Texas populations of this species of hophornbeam are common in park riparian woodland areas above 6,000 feet, with some also occurring at somewhat lower elevations in McKittrick Canyon.

Endemic plants are a special feature of Guadalupe Mountains National Park. Unique taxa occur in nooks on limestone cliffs and ledges, in high-elevation forested canyon bottoms, and along streams at lower elevation (Northington and Burgess 1979). The McKittrick pennyroyal, Guadalupe Mountain violet, McKittrick snowberry, and Guadalupe rabbitbrush, are examples of plants found nowhere else but the Guadalupe, as indicated by their names.

Fire plays an important role in the park’s ecosystem. It is a significant natural process that helps shape vegetation communities and habitat conditions within the park. Nearly every ecosystem depends on fire to maintain its health and existence. Fire speeds the process of decay and recycles valuable nutrients back into the soils. Insect pests and plant diseases are controlled. Fires limit the spread of certain plants while encouraging others to grow, and fires create a diversity of plant communities as burned areas recover at different rates. The variety of plants provides a more complex mix of food and cover for wildlife. This increased complexity in turn leads to a greater diversity of wildlife inhabiting the burned regions and a more stable and disaster-resistant ecosystem.

Within the park, seven vegetation types have been identified that correspond with the Brown-Lowe-Pase biomes as described for the biotic communities of the Southwest (Brown 1994) (Figure 11). These include the following:

- **Rocky Mountain (Petran) conifer forest** - The high country of the park, from 7,000 feet to 8,749 feet in elevation, contains a Rocky Mountain coniferous forest dominated by Douglas-fir, Southwestern white pine, and ponderosa pine.
- **Great Basin conifer woodland** - Also known as pinyon-juniper woodlands, can be found in the northern canyons of the park and on dry or west-facing slopes, commonly between 5,000 feet and 7,000 feet elevation. Overstory constituents include pinyon pine, one-seed juniper, alligator juniper, Rocky Mountain juniper, and grey oak.

- **Madrean evergreen woodland** - Oaks dominate this woodland type that is found scattered throughout the park, mostly on shady canyon slopes. Beautiful Texas madrone trees are found in this vegetative type and add to the park's charm, along with New Mexico agave, alligator juniper, sumacs, and penstemons.
- **Interior chaparral** - The drier, south-facing slopes of the park's many deep canyons are covered with dense vegetation made up of species such as mountain mahogany, ceanothus, sotols, sandpaper bush, and other shrubs that make up the interior chaparral community.
- **[Chihuahuan] semidesert grassland** - The Chihuahuan Desert once encompassed extensive grasslands, but only small remnants remain today. Stands of black grama, blue grama, muhlenbergias, and stipas (needlegrass) are still present in the park. With the cessation of livestock grazing, these grasslands are recovering and expanding.
- **Chihuahuan Desertscrub** - Chihuahuan Desertscrub or shrub occupies the lowlands of the park. Stands of widely spaced, small-leaved shrubs are scattered across bajadas, flats, and dunes. Dominant shrubs such as catclaw acacia, allthorn, ratany, apache plume, and littleleaf sumac have tiny leaves to conserve water (micro-phyllous), grow slowly, and are widely spaced on flats and gravelly hills at the base of the south- and east-facing slopes and the west escarpment. Common succulent species that can withstand desert conditions include lechuguilla, New Mexico agave, torrey yucca, ocotillo, and several species of prickly pear, cholla, hedgehog, and pincushion cactus.

Areas of Chihuahuan Desertscrub may have been grassier before grazing. Today, many are dominated by creosote bush, which is the most characteristic plant of North America's hot deserts. It competes aggressively with other plants for water, and usually wins, accounting for its prevalence in many arid locations of the southwest.

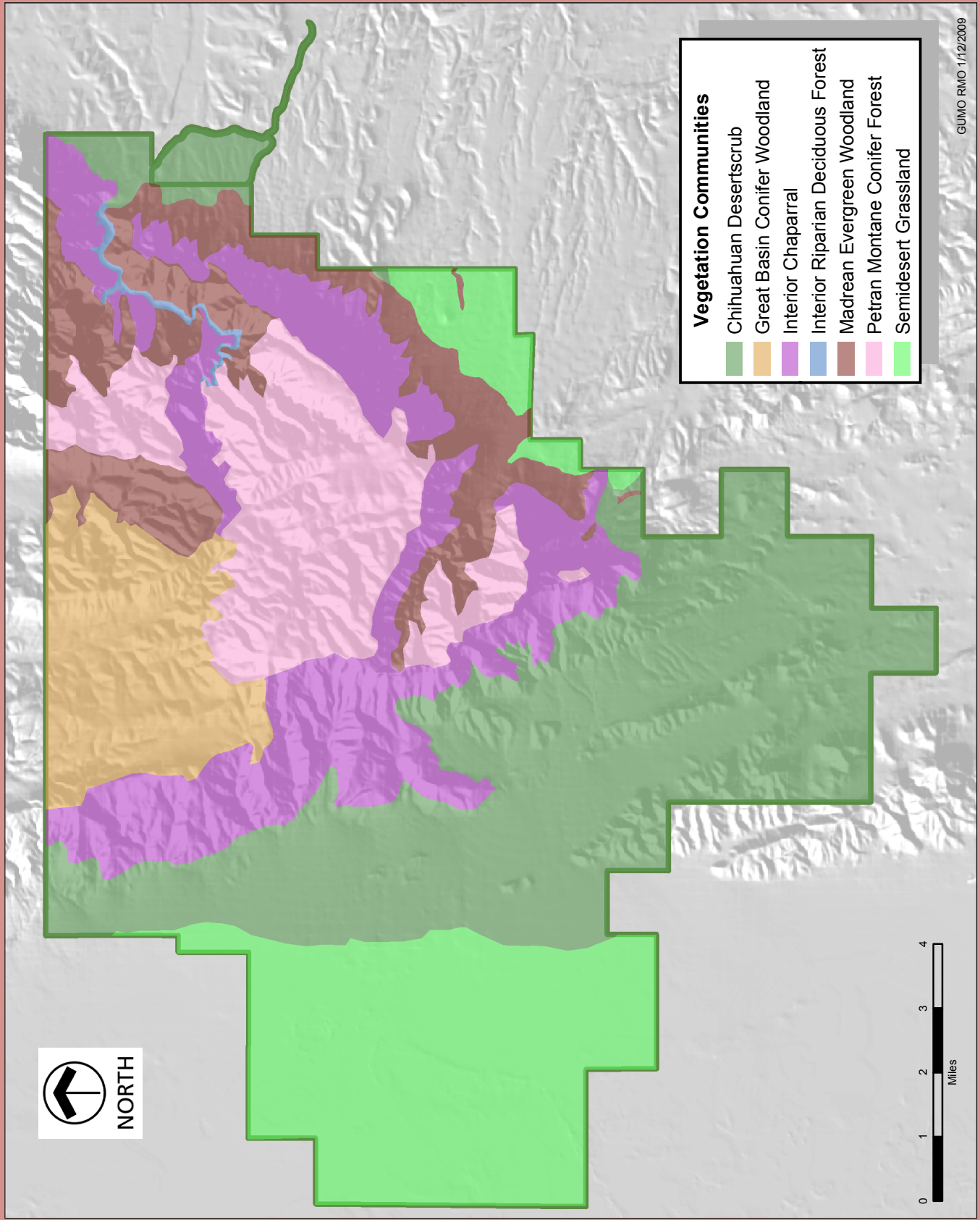
- **Interior riparian / deciduous forest** - Deciduous trees grow primarily at springs and in streambeds at low elevations but become the dominant growth form on stream terraces and in the canyon heads above about 4,921 feet (1,500 m). Deciduous trees dominate north-facing slopes at this elevation and are joined by conifers on drier sites. Little walnut and velvet ash occur at the mouths of canyons, but as the stream elevation increases, western hophornbeam, bigtooth maple, and chinkapin oak come into the mix, especially on stream terraces, around springs, and in canyon heads.

McKittrick Canyon is the key representative of the hardwood / riparian forest and woodland in the park. The canyon is a popular attraction during autumn when the maples, oaks, and other deciduous trees bring vibrant colors to the canyon. Texas madrones are common in the canyon bottom. Penstemons, orchids, and columbines, along with ferns, sawgrass, and sedges, can be found in the canyon floor, as well as cacti, century plants, sotols, and towering yuccas. Species of interest include the possibly extirpated Guadalupe fescue and the Chapline's columbine.

- **Gypsum dunes flora** - The gypsum dunes are found within the Chihuahuan semidesert grassland. The dunes' shifting sands and arid climate give rise to an ecologically unique area. Unusual botanical assemblages and hardy wildlife species endure the harsh conditions. These biological communities of the white sand dunes are an important and rare part of Texas' natural heritage.

Plants that survive on the dunes are adapted to strenuous conditions, such as high soil salinities, a mobile substrate, and large temperature fluctuations. Several unusual botanical species and communities are found on and around the dunes. About 40 plant species occur in association with the dune fields, and about 15 of these species are found in the heart of the dunes. Many of these plants are endemic. Among the most significant are the sand bluestem, broom pea, rosemary mint, soaptree yucca, and gyp grama. Rare species include Indian rice grass, gyp

Figure 11. Vegetation communities





moonpod, shy mentzelia, and the pink plains penstemon. Botanical diversity increases where the dune fields meet the surrounding grasslands and the less-saline quartzose sand areas. False buffalograss and sixweeks grama are among the roughly 30 species that occupy these transitional zones. Gypsum scalebroom is an endemic species of interest and concern.

Figure 11 shows the distribution of vegetation communities.

## Wildlife

From the Chihuahuan Desert to the conifer forest, the Guadalupe Mountains' diverse ecosystems are home to more than 60 species of mammals (Cornely 1991), 303 species of birds (including 94 breeding birds) (Newman 1997), and 55 species of reptiles and amphibians (Grace 1980 revised by Wauer 1991). The park represents a transition or overlap zone with species of birds, mammals, and reptiles present but separated from their normal range.

The park's springs and streams, including Upper Pine, Frijole, Smith, Manzanita, Choza, Guadalupe, and Bone Springs and McKittrick Creek, are important wildlife sustaining and viewing areas. In addition, the numerous intermittent springs and seeps in the park are essential for supporting wildlife. Reliable water in these places and in McKittrick Canyon attracts mule deer, mountain lion, bobcat, ringtail, gray fox, and black bear.

Some mammals that once were present in the park are gone (extirpated). Most notably these include the pronghorn, black-tailed prairie dog, grizzly bear, Mexican gray wolf, and bighorn sheep, some of which are found in suitable habitat southwest of the park. The native Merriam's elk was extirpated around the turn of the 19th century. A herd of Rocky Mountain elk was introduced in the 1940s and 1950s and is currently estimated to include about 30 animals. Exotics that are not native to the park, such as the aoudad (Barbary sheep), have been introduced and are present today. Exotics that are not native to the park, such as the aoudad that have immigrated by escaping from game ranches and rainbow trout that were introduced in the 1920s, are present today.

Several reptile species inhabit the Salt Basin Dunes area, including side-blotched lizards, long-nosed leopard lizards, western whiptail lizards, western diamondback rattlesnakes, and prairie rattlesnakes. The site's rarest animal resident is a white variety of the lesser earless lizard. This species is known to occur at only one other site in the world, the dunes of White Sands National Monument. The Rio Grande leopard frog, western box turtle, Texas banded gecko, crevice spiny lizard, roundtail horned lizard, mountain shorthorned lizard, Trans-Pecos rat snake, gray-banded kingsnake, western hooknose snake, and rock rattlesnake are amphibians and reptiles of particular interest. Possible species of interest that are suspected to be present but have not been documented include the barking frog, smooth green snake, and desert massasauga (Grace 1980 revised by Wauer 1991).

The park is home to one federal threatened wildlife species, the Mexican spotted owl.

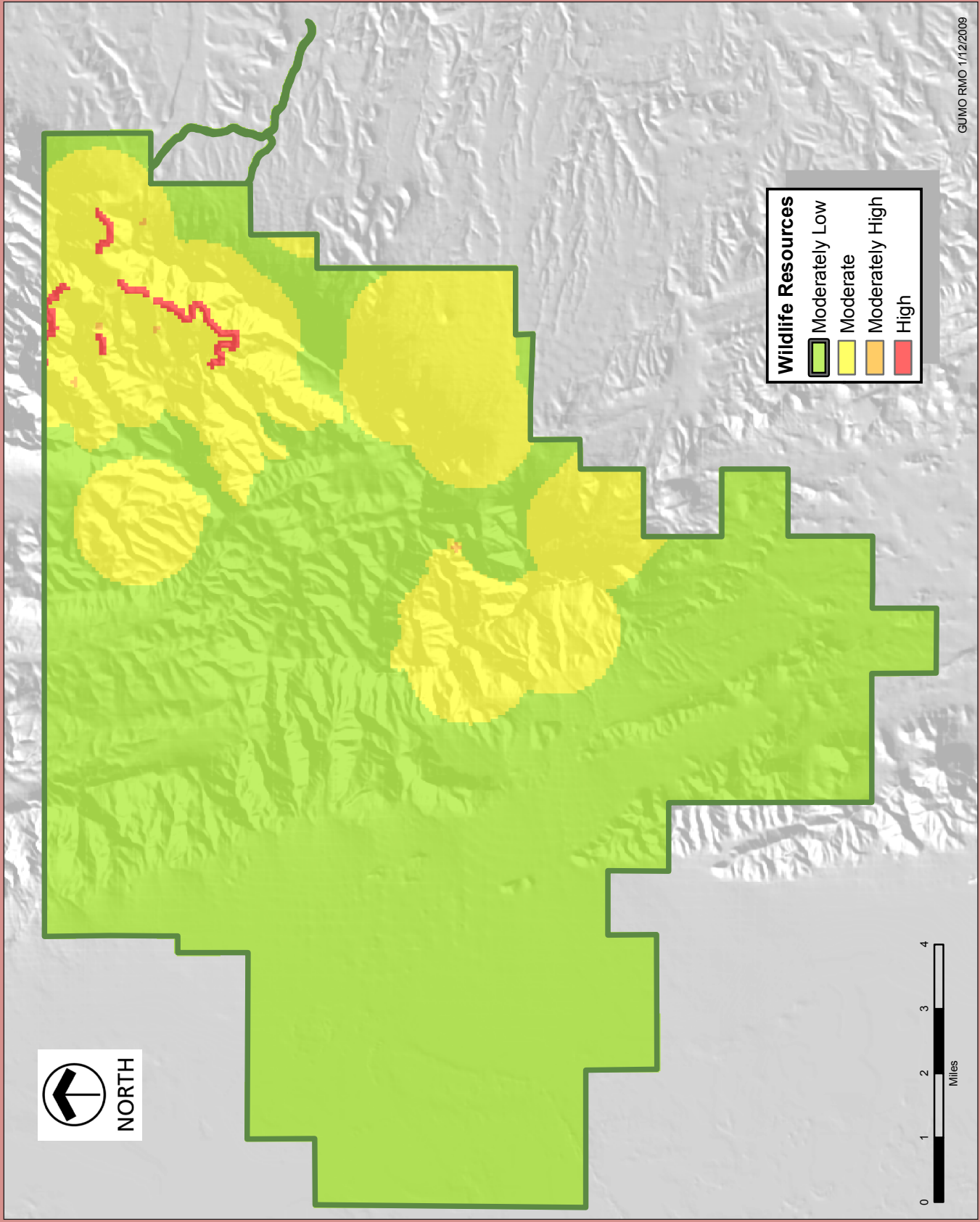
Species of interest and special concern include the Guadalupe southern pocket gopher, Mogollon vole, Texas minute moss beetle, Guadalupe Mountains tiger beetle, American peregrine falcons, yellow-billed cuckoo, and the burrowing owl.

Figure 12 displays the relative concentration of wildlife resources including threatened and endangered species, species of management concern, and aquatic habitats.



Left:  
Scorpion.  
NPS Photo.  
Far Left:  
Black-headed  
Grossbeak.  
Below:  
Rio Grande Leopard  
Frog.

Figure 12. Relative concentration of wildlife resources



## CULTURAL RESOURCES

Guadalupe Mountains National Park contains important cultural resources related to human use over time by prehistoric and historic peoples. Cultural resources range from the prehistoric Paleoindian and American Indian periods, through the historic American Indian period, into the European American periods of 19th century exploration, military operations, and settlement, which was typified by small-scale ranches. Twentieth century ranching operations consolidated and grew in size. Two of the larger-scale ranchers and landowners fostered conservation efforts that culminated in the park's establishment.

Human occupation over time in the park has witnessed a change in climate from a wetter to a more arid environment and has contributed to a change in some of the vegetation from grasslands to creosote bush and mesquite, which expanded their coverage when overgrazing occurred. Today, grazing continues around the park, except in some of the area around Dell City where underground aquifers make the irrigation of cotton, alfalfa, and chile possible.

Figure 13 displays the relative concentration of cultural resources including archaeological resources, cultural landscapes, interpreted cultural features, and cultural points of interest.

### Archeological Resources

The presence of humans in what is now Guadalupe Mountains National Park may go back as far as 13,000 years. More than 400 archeological sites are known in Guadalupe Mountains National Park and have been recorded with the Texas Archeological Research Laboratory. These range from the pre-historic Archaic Period (circa 6,000 BC to AD 1) through the late prehistoric but mostly historic Mescalero Apache Period (before European contact to late 19th century) into the historic Euro-American Period of exploration, military scouting, and settlement (16th and 17th centuries to early- to mid-20th century). The sites consist of

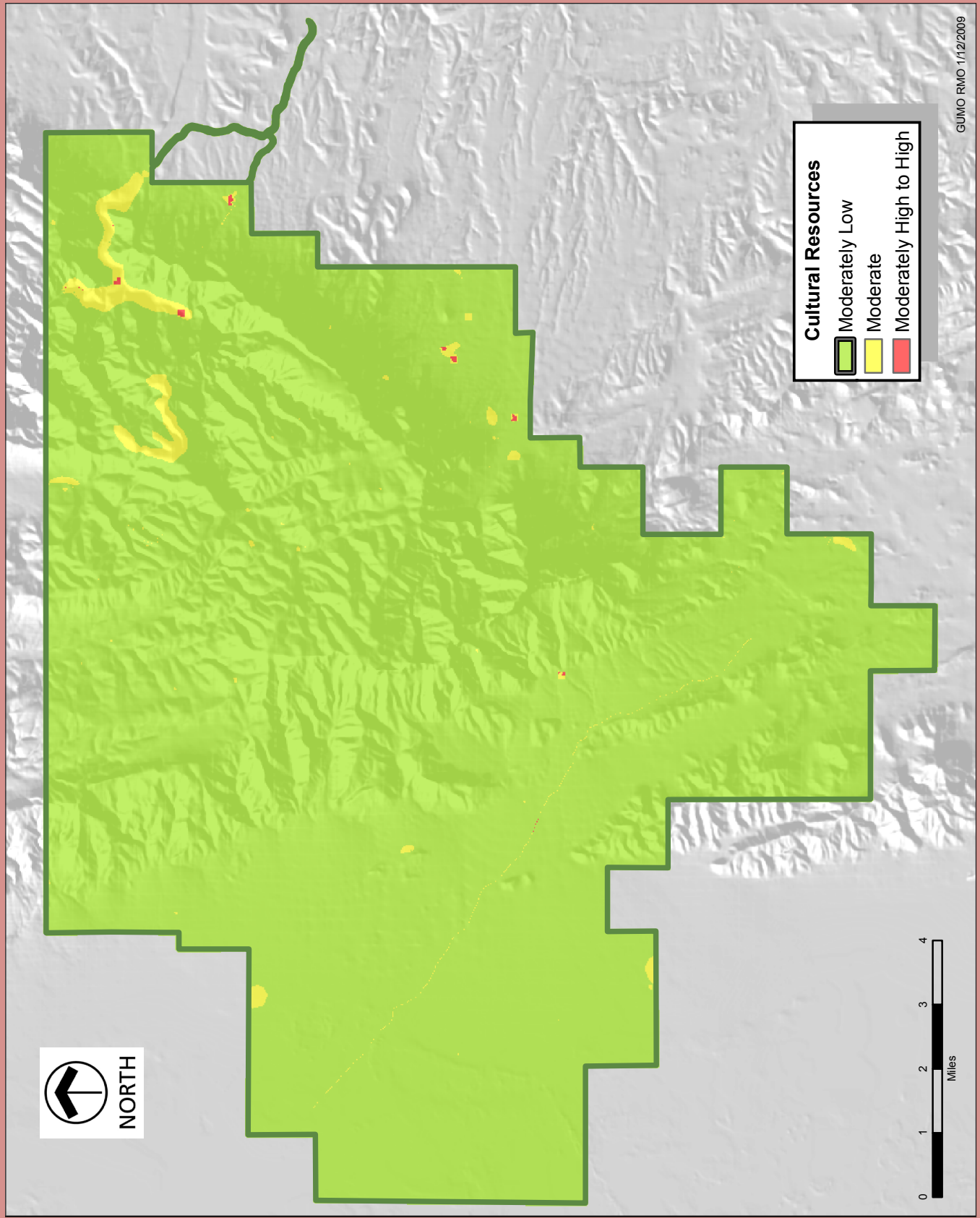
- lithic scatters; cooking pits, hearths, rock shelters, and caves suggesting encampments or habitations
- pictographs and petroglyphs
- traces of exploration, military scouting, and settlement, including stagecoach and ranching roads, remnants of equipment, and other traces of human occupation and habitation.

The McKittrick Canyon Archeological District was listed in the National Register of Historic Places on September 26, 1991. The McKittrick Canyon Archeological District is known to represent the Late Archaic (circa 1500 BC to AD 1), Formative-Transitional (AD 1 to AD 800), and Mescalero Apache Periods (AD 800 to AD 1880). The district has many of the types of habitation, encampment, and cooking pit sites found elsewhere in the park and illustrates the continuum of human occupation in what is now the park. The district includes sites related to

- the successors to the Paleoindians
- the pre-horse ancestors of the Mescalero Apaches
- the hunting and raiding Mescalero Apaches, who became superb horsemen
- the coming of the Texas and Pacific Railway in the early 1880s to Van Horn, Texas, the end of the Mescalero Apache period



Figure 13. Relative concentration of cultural resources



## Historic Structures

*Properties Listed in the National Register of Historic Places.* Four historic properties in the park have been listed in the National Register of Historic Places. They include the Frijole Ranch, Pinery Station, Wallace Pratt Lodge, and McKittrick Canyon Archeological District. The latter property is described above in the section “Archeological Resources.”

The other listed historic properties are described below.

- **Frijole Ranch House and Outbuildings.** Frijole Ranch (also known as the Guadalupe Mountain Ranch) was listed in the National Register of Historic Places on November 21, 1978. The Frijole Ranch house once served as headquarters for the Guadalupe Mountain Ranch. Frijole Ranch represents the most complete and substantial remnant of early ranching in the Guadalupe Mountains.
- **Pinery Station.** Pinery Station was listed in the National Register of Historic Places on October 9, 1974. This property, called The Pinery for the historic stand of trees in the area, includes the local limestone ruins of a stagecoach horse-changing station. The ruins include a substantial wall several feet high. The station was established at the site because water was available nearby at Pine Springs. The Pinery operated as a stage stop through August 1859. After 1859, The Pinery remained a stopping place for people trekking west along what became known as the Emigrant Trail. Marked by Guadalupe Peak from land and air, American Airlines in 1958 considered reconstructing (but never did) Pinery Station in honor of this westward route. Preservation and interpretation of this stage station was a major reason for including the 240 acres surrounding the station within the park.
- **Wallace Pratt Lodge.** The Wallace Pratt Lodge, also known as the Pratt Stone Cabin or Pratt Cabin, was listed in the National Register of Historic Places on March 26, 1975. In 1921 Wallace E. Pratt, a professional geologist in search of oil-bearing formations in the region, came to what is now the park. He was a scientist and conservationist as well as a businessman who became a vice president of the Humble Oil and Refining Company, now the Exxon-Mobil Corporation. He appreciated the scenic beauty and geological significance of McKittrick Canyon, named for Captain Felix McKittrick, an early rancher. Pratt acquired land in McKittrick Canyon, and in 1931 and 1932 he authorized the design and construction of a getaway home he called the Stone Cabin, which was located about 2.5 miles up McKittrick Canyon

Pratt and his wife lived full-time in the Stone Cabin upon his retirement in 1945. However, because of the occasional flooding of McKittrick Canyon, Pratt built a more modern, less rustic home called Ship-on-the-Desert (listed below) outside the canyon.

Beginning in 1958, Pratt donated land and property to the National Park Service. These holdings included some 5,000 acres and both buildings, and became a nucleus of the park.

*Properties Eligible or Potentially Eligible for Listing in the National Register of Historic Places.* The following historic structures have either been determined eligible or need a determination of eligibility for listing in the National Register of Historic Places. Those that have been determined eligible have been placed on the park’s list of classified structures and are managed as if they were listed. National Park Service will continue to manage those still requiring a determination of eligibility as if they were listed and will continue to work toward preparing a determination of eligibility and placing them on the park’s list of classified structures.

- Bowl Cabin (also known as the Cabin in the Bowl)
- Felix McKittrick Dugout
- Dog Canyon Copper Mines
- Hunter Cabin (also known as the Hunter Line Cabin)

- Segura Dugout
- Williams Ranch House
- Ship-on-the-Desert
- Butterfield Stage Route / Emigrant Trail
- Remnants of Historic Ranching Activities

## **Cultural Landscapes**

Cultural landscapes are geographic areas, including both natural and cultural resources, that the National Park Service manages as cultural resources for their historical significance. They may be associated with historic structures or be independent of a specific structure.

Eleven cultural landscapes have been identified at Guadalupe Mountains National Park and are listed in the NPS Cultural Landscape Inventory:

1. Ship-on-the-Desert
2. Pratt Cabin/Lodge
3. Frijole Ranch
4. Williams Ranch
5. Bowl Cabin
6. Dog Canyon
7. Hunter Line Shack
8. Pinery Station
9. Pine Springs Store/Café
10. Emigrant Trail/Butterfield Stage Route
11. McKittrick Canyon Archeological District

Only two cultural landscapes have been inventoried (Frijole Ranch and Pinery Station); the other nine have not and are therefore considered potential cultural landscapes until documentation can be completed.

Many of the cultural landscapes are associated with historic structures that either are listed in, or are potentially eligible for listing in the National Register of Historic Places. Relevant related aspects for these properties were described previously under “Historic Structures.”

## **Ethnographic Resources**

Ethnographic information has been collected from ethno-historical works, interviews, and American Indian consultations conducted by the park staff. Ethnographic resources relate to particular places or areas that contemporary peoples link to their traditional way of life and cultural heritage. Although no ethnographic resources have been identified as traditional cultural properties eligible for listing or listed in the National Register of Historic Places, such nominations are still possible.

Ethnographic landscapes are generally larger in area and broader in scope than the vernacular or designed historic landscapes that are often considered under the category of cultural landscapes. Ethnographic landscapes are important ethnographic resources. Two ethnographic landscapes are considered. One involves the Mescalero Apaches, and the other involves the Tigua Indians of Ysleta del Sur Pueblo. Components of these landscapes would be ethnographic resources.



## **Museum Collections**

The park's museum collections total about 210,000 specimens, including both catalogued and uncatalogued specimens. About 143,000 specimens are stored in the park. The other 67,000 are stored in other NPS facilities or are on loan to universities and oil companies.

Specimens and artifacts relate to geology, zoology, botany, archeology, ethnography, and history. The latter include historic photographs and material cultural items from archeological and historic sites. Basket fragments and braided hair for rope are examples of ethnographic artifacts. The collections include archival materials documenting the objects.

The collections in the park are protected by a modern detection and security alarm system. The collections are housed in part of the visitor center and administration building that has limited access. Only authorized personnel may enter. A dry-pipe, overhead sprinkler system with heat-sensitive thermocouplers activates localized flow of water only in the location of a fire. Some collections are stored in other facilities, because of the lack of space in the headquarters facility.

Facilities storing specimens from Guadalupe Mountains National Park include the following:

### **National Park Service sites**

- Carlsbad Caverns National Park in New Mexico
- Harpers Ferry (Interpretation) Center in Harpers Ferry, West Virginia
- Intermountain Support Office in Santa Fe, New Mexico
- Western Archeological and Conservation Center in Tucson, Arizona

### **Universities**

- Ohio State University
- Sul Ross State University at Alpine, Texas
- Texas A&M University at College Station
- Texas Tech University
- The University of Iowa
- The University of Texas at Austin
- The University of Wisconsin at Madison
- The University of Manchester in the United Kingdom

### **Oil Companies**

- Exxon-Mobil Corporation
- British Petroleum Corporation

A 19th century stagecoach that is part of the park's collections is on loan to and on display at Carlsbad, New Mexico, at the Carlsbad Museum and Fine Arts Center.

## STATUS OF RESOURCE KNOWLEDGE

Appropriate knowledge of park natural and cultural resources is essential for the NPS to effectively meet its resource stewardship responsibilities. This knowledge is provided through basic resource inventories, long-term monitoring of resource conditions, investigations and research, and integration or synthesis of scientific and scholarly resource information. In addition, adaptive management requires ongoing knowledge about natural systems and how management decisions affect them. Three park documents contain information on the status of the park's resources: *Resources Management Plan* (NPS 1992), *Draft General Management Plan* (NPS 2008a), and *Physical Resources Stewardship Report* (NPS 2008b). Periodic status updates to resource knowledge is achieved through and recorded in the List of Classified Structures (LCS), Cultural Landscape Automated Inventory Management (CLAIMs), Archeological Site Management Information System (ASMIS), NPSpecies, Species of Management Concern, and Threatened & Endangered Species databases.

To meet the NPS responsibilities of resource stewardship, information about park resources must be of sufficient quality and completeness to be useful and reliable for making stewardship decisions. Remediation of shortfalls in resource knowledge is integrated into comprehensive strategies in this resource stewardship strategy. Specific, focused investigations may be required to provide the level of resource knowledge necessary to manage complex issues. When the need is identified, such investigations are integrated into the comprehensive strategies in the resource stewardship strategy.

The following tables serve to present a summary of the status and completeness of resource knowledge for Guadalupe Mountains National Park. Where knowledge associated with a basic or specialized product is missing or incomplete and necessary for NPS resource stewardship, those needs are addressed in the comprehensive strategies recommended by this resource stewardship strategy.

## Natural Resources

Table 4. Natural resource inventories and studies, and research and monitoring reports

Type or Title	Status (Complete, Incomplete, In Process, Needed, Ongoing)	Notes
<b><i>Inventories and Studies</i></b>		
Natural Resource Bibliography	Incomplete	Included in 1992 RMP, but needs updating; Need to incorporate what does not currently exist in NatureBib
Base Cartographic Data	Incomplete	USGS maps and 1990 aerial photography; Facility infrastructure and natural resource distributions needed; Aerial photographs and satellite imagery needed at resolution appropriate for use with park projects
Geologic Resources Map	Incomplete	1948 USGS map, GRD map completed in 2006; Need mapping of West side (Addition); Need updated mapping to represent separation of the Carlsbad Group for exposures on top of the mountain, and separation of the Bone Spring and Cutoff Formations
Paleontological Resources Inventory	Ongoing	Over 300 sites recorded primarily along trails and roads; however, only approx. 5 % of the targeted fossil-bearing material has been surveyed
Cave Inventories	Incomplete; In Process	Re-inventory of known cave locations and significant speleothems is in process; Need cave paleo resource inventory; Need cave biota inventory
Soils Inventory and Map	Incomplete; In Process	1974 SCS map; Currently being updated to include West side
Dune Inventory and Research	Needed	Need LIDAR mapping of dunes and knowledge on natural range of variability of dune movement
Meteorology	Ongoing	Some station data is available from the National Weather Service; some from the National Interagency Fire Center
Fire Weather Data	Complete	Collected since 1977
Air Quality	Complete (baseline); Ongoing	Air pollutant wet deposition data (nitrogen and sulfur compounds) available since 1984 from NADP and ARD; visibility and fine particle data available since 1988 from IMPROVE and ARD; light extinction (transmissometer) data available 1988-2006 from ARD; ozone data available from 1987-1992 from ARD. May need data for dry pollutant deposition (CASTNet) and discrete visibility events (nephelometer); need periodic checks for ozone and light extinction
Soundscape Inventory	Needed	No baseline data exists; Need protocol
Lightscape (Night Sky) Inventory	Needed	No baseline data exists; Need protocol
Critical Viewshed Inventory and Analysis	Incomplete	“Visual resource distribution analysis” and “Lands with high resource values” maps in Draft GMP provide partial information; Need land protection priorities that correlate to and accompany the analysis
Vegetation Map	In Process	Completed in 1986 with 77% accuracy; New map will replace 1974 map based on browse surveys



Type or Title	Status (Complete, Incomplete, In Process, Needed, Ongoing)	Notes
Groundwater Inventory	Needed	Need depth to shallow groundwater and water quality analysis; Edwards Aquifer Research and Data Center (San Marcos TX) is completing a water well inventory that includes GUMO
Wetlands and Riparian Area Inventory/Map	Needed	No NWI maps exist; Need inventory and condition assessments
Water Resources Map	Complete	1980 watershed map; 1973 USGS map with springs and streams
Floodplains	Incomplete	Flash flood assessments completed for Pine Spring Canyon & Dog Canyon; McKittrick Canyon floodplain has not been evaluated
Water Quality Data	Incomplete; In Process	Water quality monitoring program established in 1982 to test parameters ( temperature, pH, nitrates, sulfates, phosphates, calcium, hardness) in McKittrick Canyon; Baseline water quality data (based on six EPA parameters) compiled in 1997; Area data from CHDN and park baseline data currently being compiled; current water quality conditions being sampled for comparative analysis where there is baseline data
Large Mammal Inventories	Complete	Elk study in 1981; Mountain lion study 1983-1986; Need to determine focal wildlife species for each vegetation community
Small Mammal Inventories	Complete	Need to determine focal wildlife species for each vegetation community
Bird Inventories	Complete	Mexican spotted owl survey completed in 2005; Peregrine falcon nest sites in park files; Need to determine focal wildlife species for each vegetation community;
Fish Inventories	Complete	Park needs to make a management decision regarding the status of rainbow trout in McKittrick Canyon
Benthic Communities	Complete	Need to determine focal wildlife species for each vegetation community
Invertebrate Inventories	Incomplete; Needed	Macro-invertebrate inventory of McKittrick Canyon completed in 1992; Need systematic invertebrate inventory and determination of focal species for each vegetation community
Vascular Plant Inventory - native	Complete	Need to determine species distribution of species of management concern; 90% or more of species expected to occur have been documented
Vascular Plant Inventory - exotic plant	Incomplete	Need to compile exotic plant location data and treatment maps to monitor efficacy and re-invasion
Federal/State Threatened/ Endangered Species	Ongoing	Rare plant survey completed in mid-1970s; Rare plant map completed by Texas Natural Heritage Program in 1986; Map of McKittrick Pennyroyal completed in 1988; Need to complete distribution inventories and produce maps
Species of Management Concern	Incomplete	Need to complete distribution inventories and produce maps

Type or Title	Status (Complete, Incomplete, In Process, Needed, Ongoing)	Notes
Fire Cause Reports – Human vs. Natural	Complete; Ongoing	
Fuels Mapping	Incomplete; Ongoing	
Backcountry Campsite Human Disturbance Assessment	Incomplete	Initially completed in 1995; Need to re-assess for disturbances, exotic plants, and social trails
Wilderness Eligibility Assessment	Complete	Completed in 2008 and included in Draft GMP
Wilderness Study and Recommendation	Needed	
Fire Effects Plot Data	Incomplete; Ongoing	
<b>Research and Monitoring Reports</b>		
Air Quality and Visibility	Ongoing	Data on air pollutant wet deposition, including nitrogen and sulfur compounds (NADP), collected weekly since 1984; data on visibility conditions and fine particles (IMPROVE) collected since 1988; light extinction (transmissometer) monitored from 1988-2006; ozone monitored from 1987-1992
CHDN Inventory and Monitoring Reports	Needed; Ongoing	Need to maintain species records in NPSpecies, train park staff in monitoring protocols, and provide park managers with status of resources based on monitoring activities
Investigator's Annual Reports	Incomplete; Ongoing	Need to verify status and location of research specimens and associated published and unpublished materials on park resources; Need to keep specimen loan agreements up to date

## Cultural Resources

Table 5. Cultural resource inventories, studies, and research reports

Type or Title	Status (Complete, Incomplete, In Process Needed, Ongoing)	Notes
Cultural Resource Bibliography	Incomplete	Included in 1992 RMP; Needs updating
Archeological Overview and Assessment	Complete	Needs update
Section 110 Archeological Inventory	Incomplete	Completed in three phases (1970, 1973, 1975), but 30-40% of park has not been surveyed
Condition Assessments of Archeological Sites	Incomplete	Need to re-evaluate sites with missing or incomplete data
Archeological Site Management Information System (ASMIS)	Incomplete; Ongoing	95% of known sites are in the system; Completeness of records is highly variable based on data in original site reports
Collection Condition Surveys	Complete; Ongoing	Annual random sample and controlled property inventories completed
Scope of Collections Statement	Complete	Needs review
Automated National Catalog System (ANCS+)	Incomplete	Backlog cataloging exists
EO 11593 Historic Resource Inventory	Complete	Complete according to the 1992 Resource Management Plan
Historic Resource Study	In Process	
Historic Structure Reports	Needed	Needed for Frijole Ranch, Williams Ranch, Hunter Line Cabin, SOD, Pratt Cabin
List of Classified Structures (LCS)	Complete	Some database fields need updating
National Register of Historic Places (NRHP) Nomination Forms	Incomplete; Needed	Complete for Pratt Cabin, Frijole Ranch House, Pinery Station, and McKittrick Canyon Archeological District; Needed for SOD and other properties listed as eligible in LCS and/or CLI
Cultural Landscape Inventories (CLI)	Incomplete	Pinery Station complete (P. Froeschauer, 1999); Needed for SOD, Williams Ranch, Hunter Line Cabin, Bowl Cabin, McKittrick Canyon arch. district, Dog Canyon mining, Pine Springs store, and Butterfield Stage Route/Emigrant trail
Cultural Landscape Reports	Incomplete	Frijole Ranch complete (P. Froeschauer, 1995); Needed for SOD, Pratt Cabin, Pinery, Williams Ranch, and Hunter Line Cabin
Ranching Artifacts Inventory	Needed	Most structures are included in LCS; Need inventory and mapping of old fencelines, and historic parcel ownership or management
Ethnographic Overview and Assessment	Incomplete	Needs update to include all affiliated tribes
Cultural Affiliation Studies	Needed	Need to identify Traditional Cultural Properties



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# INDICATORS OF RESOURCE CONDITION AND TARGET VALUES

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## METHODOLOGY

A methodical process was used for selecting indicators and establishing target values. These steps were followed:

1. Understand the desired conditions for the resource (fundamental and other important resources and values).
2. Identify the attribute(s) that help describe the resource. The attributes will often serve as the indicator topic.
3. Identify the influence(s) that affect the condition of the resource.
4. Identify the indicator(s) that will be used to monitor resource condition. Specify the unit of measurement.
5. Establish quantifiable target value(s) that represent the desired condition of the resource.
6. Determine the current condition of the resource according to the selected indicator.

Table 6 identifies the desired conditions, attributes, influences (beneficial and detrimental), indicators, target values, and current conditions of the park's major resource categories.

Existing natural and cultural resource databases were reviewed for information on resource condition assessment methods and appropriate indicators. In many cases, subject matter experts selected existing databases that provided good measurable parameters to determine physical condition and integrity of natural or cultural resources. For certain resources, other sources of information were used to select indicators and provide information on resource condition. The section below explains what type of information and databases were utilized to select indicators and target values for each of the major resource types that exist in the park.

Existing natural and cultural resource databases were reviewed for information on resource condition assessment methods and appropriate indicators. The RSS planning team compiled a list of potential indicators and evaluated them using four factors: management significance, resource significance, feasibility and cost-effectiveness, and legal/policy mandate. The results of this process allowed the planning team to select the best indicators. In many cases, subject matter experts selected existing databases that provided good measurable parameters to determine physical condition and integrity of natural or cultural resources. For certain resources, other sources of information were used to select indicators and provide information on resource condition. Until resource monitoring occurs and park staff have a chance to evaluate the utility and effectiveness of the indicator data, we cannot be certain that park resources and target values are within their natural or acceptable range of variation. In fact, the natural range of variability for many resources is not known and therefore many of the RSS indicators and target values have been labeled as "interim" until such time that the appropriate knowledge can be acquired. The indicators and target values will be refined and improved over time.

The section below explains what type of information and databases were utilized to select indicators and target values for each of the major resource types that exist in the park. The selected indicators are included in table 6.

The identification and organization of resource types within this section was chosen to mirror the organization of the park's fundamental (and other important) resources and values – the common thread that ties together all levels of planning in the NPS. Therefore, certain resources, such as air quality or wilderness character, are included within the framework of these foundational resource categories.

## **GEOLOGIC RESOURCES**

The condition of geologic resources, including fossils and other paleontological resources, will be evaluated according to (and by utilizing) the Paleontological Locality Condition Evaluation Form (NPS 2005) and the GSA GeoIndicators Monitoring Assessment Form (pending). The “actual loss score” for each locality was determined to be the most important variable for assessing condition using the Paleontological Locality Condition Assessment Form. The park needs to determine what is considered “no *significant* change from year to year” prior to implementing the Paleontological Locality Condition Evaluation Form. The specific criteria to be utilized for the GSA Monitoring Assessment Form has yet to be determined because new protocols are currently being developed.

The condition of the salt basin/dunes will be evaluated by measuring changes in dune formations and features using Light Detection and Ranging (LIDAR) mapping, as well as by evaluating changes in shallow groundwater depth.

While there are no specific indicators in this resource stewardship strategy for measuring the condition of soils in the park, the soils program within the NPS (a part of the Geological Resources Division) has been participating with the other federal land management agencies (namely USDA-ARS Jornada Range) to develop a series of qualitative and quantitative assessments for measuring ecosystem health (i.e., rangeland health) that include soils as an indicator. The park should monitor the progress of these efforts and evaluate the use of any indicators or parameters that are selected.

The measurement tool for assessing the condition of caves and karst features in the park has yet to be determined because the level of resource knowledge was deemed inadequate. Also, current NPS cave monitoring protocols are under review and may be revised. Appropriate indicators for assessing the condition of caves and karst will need to be developed.

The condition of natural specimens that are part of the park's museum collections will be evaluated by using existing databases (ANCS+ standards) and condition assessment procedures (random sample and controlled property inventories, and photographic documentation).

## **SCENIC RESOURCES**

The condition of scenic resources will be evaluated by measuring influences on, and changes in, unobstructed views and wilderness character. Air quality parameters are included as part of this resource type.

Visibility condition will be evaluated by measuring fine and coarse atmospheric particles and aerosols, according to methods developed by the Interagency Monitoring of Protected Visual Environments (IMPROVE) network. The IMPROVE network monitors visibility nationwide in Class I areas on a one in three day schedule throughout the year in order to track progress towards natural visibility conditions required by the Clean Air Act. The National Park Service has been working with the State of Texas to define natural conditions for visibility at the park for the 20 percent least and most impaired days. The Environmental Protection Agency requires States to track visibility using the deciview index, computed from measurements of fine particles in the atmosphere, including sulfate,



Cactus flowers.  
NPS Photo.

nitrate, carbon, and organics less than 2.5 microns in diameter (PM<sub>2.5</sub>) and coarse particles less than 10 microns in diameter (PM<sub>10</sub>).

Because of periodic and short-term impairment events, such as duststorms, the park may choose to supplement IMPROVE measurements with a nephelometer. This instrument provides continuous measurements of aerosol extinction, a surrogate for visibility. A nephelometer would provide better time resolution of events captured on the IMPROVE filters and indicate the frequency and magnitude of visibility impairment events on days not currently monitored under the IMPROVE sampling protocol.

Air pollutant deposition will be evaluated using protocols developed by the National Atmospheric Deposition Program (NADP), a network of over 250 sites nationwide. NADP measures only the wet portion of total deposition. The NADP sampler collects weekly precipitation samples for analysis in a central laboratory. Precipitation is analyzed for nitrate, ammonium, sulfate, hydrogen ions, and other cations and anions. Data are reported as concentrations, in milligrams per liter (mg/L), or deposition, in kilograms per hectare (kg/ha). The park may choose to include monitoring of dry deposition to get better estimates of total deposition.

Wilderness character will be evaluated primarily by assessing the condition of dark night skies and natural sounds. The quality of dark night skies will be evaluated by measuring Zenith sky brightness and total sky brightness. Working with the NPS Air Resources Division (ARD) Night Sky Program, the condition assessment techniques for this resource may be altered. The quality of the park's soundscape (a component of wilderness character) will be evaluated by assessing the frequency and loudness of non-natural sounds in the park's backcountry and frontcountry settings (during the day and at night). The target values established for this resource are interim, as well as the condition assessment techniques, and both will be re-evaluated in consultation with the NPS ARD Natural Sounds Program.



## NATURAL RESOURCES

The natural resource values of the park were categorized as follows: wilderness, natural hydrologic processes, and Northern Chihuahuan Desert biotic communities/natural diversity. Where relevant and appropriate, the Vital Signs for CHDN and the park, included in Appendix D, were utilized as indicators for the resource stewardship strategy. The Vital Signs Monitoring program uses accepted scientific protocol and indices of condition to evaluate the condition of key park resources.

The condition of designated wilderness will be evaluated by measuring human disturbances (including the extent of ground disturbance, the number of unauthorized uses, and changes in social trails) and the presence of exotic species (plants and animals).

The condition of natural hydrologic processes will be evaluated by measuring parameters of surface water quantity (discharge) and quality (total nitrogen, total phosphorus, turbidity, the Benthic Index of Biological Integrity (BIBI), and the Habitat Quality Index (HQI)). The target values established for these parameters are interim and will be re-evaluated in consultation with the NPS Water Resources Division and other partners. The Physical Resources Stewardship Report (NPS 2008b) developed by the Natural Resource Program Center recommends an additional set of indicators and target values (for water temperature, bacteria, dissolved oxygen, and pH) for monitoring water quality should the park ever be in a position to expand its monitoring program.

The condition of Northern Chihuahuan Desert biotic communities and natural diversity will be evaluated by measuring changes in plant cover, species richness, the number of severely reduced or extirpated species, the presence of exotic species, acid rain deposition, changes in large-scale sheet erosion, and indicators of large-scale climate change. The methodology and practicality of the latter of these is undetermined and may be modified or eliminated. Also, using species richness as an indicator needs to be evaluated relative to a cooperative effort by the park and CHDN to determine focal species for each of the park's vegetation communities. One or more of the resource stewardship strategy indicators for determining the condition of plants and animals in the park may need to be altered or eliminated based on new knowledge.

## CULTURAL RESOURCES

The cultural resource values of the park were categorized as follows: archeological resources, ranching landscape, Wallace Pratt properties, other cultural landscapes (including ethnographic resources), and museum collections and archives. Where relevant and appropriate, existing resource condition assessment methods and databases were selected as resource stewardship strategy indicators.

The condition of archeological resources will be evaluated by using a park-created form to document site conditions. Certain criteria (depositional integrity, site disturbance level, and threat or disturbance type) were determined by park and regional staff to be the best evaluation factors and will be utilized. The Archeological Sites Management Information System (ASMIS) condition assessment will also be utilized.

The condition of historic structures and cultural landscapes that are part of the ranching landscape (or other cultural landscapes) and the Wallace Pratt properties will be determined by utilizing the List of Classified Structures (LCS) condition assessment, Cultural Landscape Inventory (CLI) condition rating, and Facility Condition Index (FCI) conditions status entered into the Facility Maintenance Software System (FMSS). The databases will be used together to determine resource condition. Each of these databases has a monitoring component and is updated periodically. FMSS is a repository of facility management information with an annual and 5-year inspection component. Appendix

E contains a summary of the LCS condition assessment ratings for the park's classified structures.

The condition of historic objects or artifacts that are part of the park's museum collections and archives will be evaluated by using existing databases (ANCS+ standards) and condition assessment procedures (random sample and controlled property inventories, and photographic documentation) – the same way that natural specimens/ collections are evaluated and managed.

## **MONITORING**

Each of the indicators selected for this resource stewardship strategy has different monitoring requirements. Some of the monitoring requirements (including methodology and frequency of monitoring) are dependent upon the development of monitoring protocols – many of which have yet to be developed. The park will be responsible for developing these protocols and implementing the monitoring program. The comprehensive strategies that are part of this resource stewardship strategy contain activities designed to address these monitoring needs.

The monitoring that is required for the RSS exceeds that required to monitor the park's Vital Signs. The park's monitoring program will need to be expanded by training park staff and utilizing cooperators. It is entirely possible that new or different monitoring priorities may arise over the life of this plan (such as for climate change response and adaptation); therefore, park staff will have to be diligent in adapting to and incorporating new initiatives and programs within the framework of this RSS.





Table 6. Desired conditions, attributes, influences, indicators, target values, and current conditions

Fundamental or Other Important Resources and Values	Desired Conditions	Attributes	Beneficial Influences	Detrimental Influences	Indicators	Target Value (= Desired Condition)	Current Condition	Target Met?
<b>GEOLOGIC RESOURCES</b>								
Capitan Reef and Related Deposits	The park's geologic resources are preserved and protected as integral components of the park's natural systems.	<ul style="list-style-type: none"> <li>Fossil reef exposures/paleo specimens</li> <li>Hillslope features and processes</li> <li>Geologic formations</li> <li>Depositional features</li> <li>Geomorphic processes</li> <li>Weathering</li> </ul>	• Remote location	<ul style="list-style-type: none"> <li>Natural erosion processes</li> <li>Accelerated erosion processes</li> <li>Roads and trails</li> <li>External minerals development</li> <li>Fossil collection</li> <li>Climate change</li> <li>Plant collection</li> <li>Visitor impacts</li> <li>Research sampling</li> <li>Air quality</li> <li>Vegetation</li> <li>Fire</li> </ul>	1. Change in specimen abundance at paleo localities (a.k.a. the "Actual Loss" score) as measured by the Paleontological Locality Condition Assessment Form criteria	1. Actual Loss score = 20 for each locality	1. 63 of 65 localities actual loss score = 20 (30 additional localities evaluated using a different form without any point scoring)	1.No
	[All] Paleontological resources, including both organic and mineralized remains in body or trace form, are protected, preserved, and managed for public education, interpretation, and scientific research.				2. GSA Monitoring Assessment (specific criteria TBD)	2. TBD	2. Unknown	2.Unknown
Western Escarpment Geological Section	The park's geologic resources are preserved and protected as integral components of the park's natural systems.	• Geologic strata/fault	• Remote location	<ul style="list-style-type: none"> <li>Natural erosion processes</li> <li>Accelerated erosion processes</li> <li>Roads and trails</li> <li>External minerals development</li> <li>Fossil collection</li> <li>Climate change</li> <li>Plant collection</li> <li>Visitor impacts</li> <li>Research sampling</li> <li>Air quality</li> <li>Vegetation</li> <li>Fire</li> </ul>	1. Change in specimen abundance at paleo localities (a.k.a. the "Actual Loss" score) as measured by the Paleontological Locality Condition Assessment Form criteria	1. Actual Loss score = 20 for each locality	1. 63 of 65 localities actual loss score = 20 (30 additional localities evaluated using a different form without any point scoring)	1.No
	Paleontological resources, including both organic and mineralized remains in body or trace form, are protected, preserved, and managed for public education, interpretation, and scientific research.				2. GSA Monitoring Assessment (specific criteria TBD)	2. TBD	2. Unknown	2. Unknown
Salt Basin / Dunes	The park's geologic resources are preserved and protected as integral components of the park's natural systems.	<ul style="list-style-type: none"> <li>Gypsiferous soils</li> <li>Landforms and geomorphic features</li> </ul>	• Remote location	<ul style="list-style-type: none"> <li>Natural erosion processes</li> <li>Roads and trails</li> </ul>	1. % change in spatial extent of dunes, dune fields and sand sheets as measured by LIDAR	1. ≤ natural variability as determined by changes in size,	1. Unknown	1. Unknown

Fundamental or Other Important Resources and Values	Desired Conditions	Attributes	Beneficial Influences	Detrimental Influences	Indicators	Target Value (= Desired Condition)	Current Condition	Target Met?
Salt Basin / Dunes (continued)	The National Park Service actively seeks to understand and preserve the soil resources of the park, and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources. Natural soil resources and processes function in as natural a condition as possible, except where special considerations are allowable under policy.	(coppice dunes, shoreline terraces and ridges, salt lake deposits, gypsum sand dunes); • Windblown features and processes (dune formation and stability)		<ul style="list-style-type: none"> <li>• External minerals development</li> <li>• Climate change</li> <li>• Plant collection</li> <li>• Visitor impacts</li> <li>• Research sampling</li> <li>• Air quality</li> <li>• Vegetation</li> <li>• Fire</li> <li>• Water farms</li> <li>• Waste brine disposal (desalinization plant)</li> <li>• Ranching</li> <li>• Illegal ORV use</li> <li>• Water quality</li> </ul>	mapping	shape, and position of the dunes utilizing LIDAR survey analysis		
					2. % change of target elevation to shallow groundwater	2. No change from natural seasonal baseline data	2. Unknown	2. Unknown
Caves and Karst	Caves and karst are managed in accordance with approved cave management plans to perpetuate the natural systems associated with the caves and karst.  Paleontological resources, including both organic and mineralized remains in body or trace form, are protected, preserved, and managed for public education, interpretation, and scientific research.	<ul style="list-style-type: none"> <li>• Caves</li> <li>• Karst landscapes / systems</li> <li>• Sedimentation processes</li> <li>• Water quality</li> <li>• Water chemistry</li> <li>• Drip and rimstone pools</li> <li>• Cave formations</li> <li>• Unique cave biota</li> <li>• Paleo resources</li> <li>• Archeological resources</li> </ul>	• Remote location	<ul style="list-style-type: none"> <li>• Natural erosion processes</li> <li>• Accelerated erosion processes</li> <li>• Roads and trails</li> <li>• External minerals development</li> <li>• Fossil collection</li> <li>• Climate change</li> <li>• Visitor impacts</li> <li>• Research sampling</li> <li>• Air quality</li> <li>• Land use modification</li> <li>• Ground water extraction</li> <li>• Alteration of surface drainage</li> <li>• Waste disposal</li> </ul>	<i>Interim</i> 1. Photo-monitoring of caves and karst	<i>Interim</i> 1. No change from established baseline condition	1. Unknown	1. Unknown
					2. Inventory and survey of caves and karst	2. No change from established baseline condition	2. Unknown	2. Unknown
Museum Collections	[All geological and] Paleontological resources, including both organic and mineralized remains in body or trace form, are protected, preserved, and managed for public education, interpretation, and scientific research. All museum collections (objects, artifacts, specimens, and manuscript collections) are identified and inventoried, catalogued, documented, preserved, and protected.	<ul style="list-style-type: none"> <li>• Type specimens</li> <li>• Field notes</li> <li>• Protection and preservation</li> <li>• Condition (completeness and condition)</li> </ul>	<ul style="list-style-type: none"> <li>• Restricted access to specimens and museum records</li> <li>• Backup data sets in various locations</li> <li>• Climate controlled environment for many specimens</li> </ul>	<ul style="list-style-type: none"> <li>• Scattered distribution</li> <li>• Object stability</li> <li>• Institutional stability</li> <li>• Adherence to curation standards by other institutions</li> <li>• Exhibits</li> </ul>	1. ANCS+ standards	1. % of applicable standards met	1. TBD	1. No
					2. Random sample inventory (completeness and condition)	2. 100 % complete (all objects accounted for) and no deterioration of specimens	2. 100 % complete and no change documented	2. Yes

Fundamental or Other Important Resources and Values	Desired Conditions	Attributes	Beneficial Influences	Detrimental Influences	Indicators	Target Value (= Desired Condition)	Current Condition	Target Met?
Museum Collections (continued)	Provision is made for access to and use of items in the collections for exhibits, research, and interpretation. The qualities that contribute to the significance of collections are protected in accordance with established standards.		<ul style="list-style-type: none"> <li>• Access to collections for interpretive and research purposes</li> </ul>	<ul style="list-style-type: none"> <li>• Improper storage</li> <li>• Long delays between accessioning and cataloging</li> <li>• Insect activity</li> <li>• Lack of regular maintenance/conservation</li> </ul>	3. Controlled property inventory (completeness and condition)	3. 100 % complete (all objects accounted for) and no deterioration of specimens	3. 100 % complete and no change documented	3. Yes
					4. % completeness of photographic documentation	4. 100%	4. TBD	4. No
<b>SCENIC RESOURCES</b>								
Unobstructed Views (Visibility and Scenic Vistas)	<p>Air quality in the park meets national ambient air quality standards for criteria pollutants and protects air quality-sensitive resources, including soils, waters, vegetation, or visibility. Natural visibility conditions exist in the park and scenic views of the landscape are not impaired by human activities.</p> <p>Scenic vistas from within and outside the park boundaries are protected from significant intrusions.</p> <p>Land protection plans are prepared to determine and publicly document what lands or interests in land need to be in public ownership, and what means of protection are available to achieve the purposes for which the park was created.</p>	<ul style="list-style-type: none"> <li>• Air quality</li> <li>• Visibility (fine particles, light scattering, light absorption)</li> <li>• Air pollutant deposition (nitrogen and sulfur compounds)</li> <li>• Viewshed/scenic vistas</li> </ul>	<ul style="list-style-type: none"> <li>• Class 1 air quality area</li> <li>• Remote location</li> <li>• Sub-rural, wilderness character</li> <li>• Topography (elevational gains)</li> <li>• Lack of roads (within park) challenging iconic vistas</li> </ul>	<ul style="list-style-type: none"> <li>• Air pollution from distant sources (vehicles, powerplants, agricultural activities, industry, and fires)</li> <li>• Climatic factors</li> <li>• Traffic/road use</li> <li>• Highway and other unpaved roads</li> <li>• Power generation</li> <li>• Land use (encroaching urbanization)</li> <li>• Vegetative cover</li> <li>• Contrails</li> </ul>	1. Visibility monitored by the IMPROVE network and expressed using the deciview index	1. Deciview index $\leq$ 2 on the 20% least impaired days and $\leq$ 12 on the 20% most impaired days	1. Deciview index average of 6 on the 20% least impaired days and 17 on the 20% most impaired days (2000-2004 data)	1. No
					2. Wet deposition of inorganic nitrogen and sulfur expressed as kilograms per hectare per year (kg/ha/yr)	<i>Interim</i> 2. $\leq$ 1 kg/ha/yr for nitrogen or sulfur	2. Wet N deposition = 1.9 kg/ha/yr; Wet S deposition = 1.6 kg/ha/yr (1998-2006 data)	2. No
					3a. Change in land use cover type (# of new buildings, roads, utility lines, disturbed land) inside of park (internal viewshed)	3a. No significant change of internal viewshed as measured by GIS and aerial photography	3a. Unknown	3a. Unknown
					3b. Change in land use cover type (# of new buildings, roads, utility lines, disturbed land) outside of park (external viewshed)	3b. No significant change of external viewshed as measured by GIS and aerial photography	3b. Unknown	3b. Unknown



Fundamental or Other Important Resources and Values	Desired Conditions	Attributes	Beneficial Influences	Detrimental Influences	Indicators	Target Value (= Desired Condition)	Current Condition	Target Met?
<p>Dark Night Skies and Natural Sounds (wilderness character)</p>	<p>Wilderness characteristics and values are retained and protected. Wilderness is managed to retain its primeval character and natural conditions. Visitors continue to find opportunities for solitude and primitive, unconfined recreation. Signs of people remain substantially unnoticeable.</p>	<ul style="list-style-type: none"> <li>Night skies/light pollution</li> <li>Soundscapes</li> <li>Stream aesthetics (water quality and quantity addressed below)</li> </ul>	<ul style="list-style-type: none"> <li>Shielded and/or reduced lighting in developed zones within park</li> <li>Roads are located at periphery</li> <li>Military overflights attempt to avoid park</li> <li>Low density and dispersed recreational use</li> </ul>	<ul style="list-style-type: none"> <li>Scattered point sources of light pollution outside the park</li> <li>Growth of urban areas</li> <li>Highway noise</li> <li>Aircraft noise</li> <li>Human noise</li> </ul>	<p>1a. Zenith sky brightness (magnitudes per square arcsecond) as measured by Sky Quality Meter</p>	<p>1a.TBD (maintain current condition; ≤ 5% degradation)</p>	<p>1a.Unknown</p>	<p>1a.Unknown</p>
	<p>1b. Total sky brightness (magnitudes per square arcsecond)</p>				<p>1b. TBD</p>	<p>1b. Unknown</p>	<p>1b. Unknown</p>	
	<p><i>Interim</i> 2. % time human-caused sounds audible per day (backcountry and frontcountry; daytime and nighttime)</p>				<p>2a. Backcountry, daytime = Hourly % time audible is &lt; 25% for 90% of the day</p>	<p>2a. Unknown</p>	<p>2a. Unknown</p>	
					<p>2b. Backcountry, nighttime = Hourly % time audible is &lt; 20% for 90% of the night</p>	<p>2b. Unknown</p>	<p>2b. Unknown</p>	
					<p>2c. Frontcountry, daytime = Hourly % time audible is &lt; 50% for 60% of the day</p>	<p>2c. Unknown</p>	<p>2c. Unknown</p>	
					<p>2d. Frontcountry, nighttime = Hourly % time audible is &lt; 30% for 80% of the night</p>	<p>2d. Unknown</p>	<p>2d. Unknown</p>	
	<p>3. Sound level as expressed by hourly decibel (dB) level (backcountry and frontcountry; daytime and nighttime)</p>				<p>3a. Backcountry, daytime = The hourly change in exposure does not exceed 3 dB for 70% of the day and 6 dB for 90% of the day; human-caused sound events never exceed 65 dB</p>	<p>3a. Unknown</p>	<p>3a. Unknown</p>	
<p>Backcountry use is managed in accordance with a backcountry management plan (or other plan addressing backcountry uses) that is designed to avoid unacceptable impacts on park resources or adverse effects on visitor enjoyment of appropriate recreational experiences. The National Park Service seeks to identify acceptable limits of impacts, monitors backcountry use levels and resource conditions, and takes prompt corrective action before unacceptable impacts occur.</p>								
<p>Excellent opportunities to see the night sky continue to be available. Artificial light sources both within and outside the park do not unacceptably adversely affect opportunities to see the night sky.</p>								
<p>The National Park Service preserves the natural ambient soundscapes, restores degraded soundscapes to the natural ambient condition wherever possible, and protects natural soundscapes from degradation resulting from human-caused noise. Disruptions from recreational uses are managed to provide a high-quality visitor experience that is consistent with the goal to preserve or restore the natural quiet and natural sounds.</p>								

Fundamental or Other Important Resources and Values	Desired Conditions	Attributes	Beneficial Influences	Detrimental Influences	Indicators	Target Value (= Desired Condition)	Current Condition	Target Met?
Dark Night Skies and Natural Sounds (continued)						3b. Backcountry, nighttime = The hourly change in exposure does not exceed 3 dB for 90% of the night and 6 dB for 95% of the night; human-caused sound events never exceed 45 dB	3b. Unknown	3b. Unknown
						3c. Frontcountry, daytime = The hourly change in exposure does not exceed 3 dB for 40% of the day and 6 dB for 90% of the day; human-caused sound events never exceed 65 dB	3c. Unknown	3c. Unknown
						3d. Frontcountry, nighttime = The hourly change in exposure does not exceed 3 dB for 70% of the night and 6 dB for 95% of the night; human-caused sound events never exceed 45 dB	3d. Unknown	3d. Unknown
<b>NATURAL RESOURCES</b>								
Wilderness	Wilderness characteristics and values are retained and protected. Wilderness is managed to retain its primeval character and natural conditions. In these undisturbed natural settings, natural processes predominate. Signs of people remain substantially unnoticeable.	<ul style="list-style-type: none"> <li>Ecosystem</li> <li>Vegetation</li> <li>Wildlife</li> <li>Human disturbance</li> </ul>	<ul style="list-style-type: none"> <li>Climate (aids seed set/bank)</li> <li>Disturbance regimes (flooding, wildfire, insect outbreaks, historic land)</li> </ul>	<ul style="list-style-type: none"> <li>Exotic species</li> <li>Climate (drought, extreme fire)</li> <li>Disturbance regimes (flooding, wildfire, insect)</li> </ul>	1. % change in spatial extent (square meters) of human disturbance area at backcountry campground (1998 baseline data)	1. 0% increase in spatial extent relative to the minimum baseline	1. Unknown	1. Unknown

Fundamental or Other Important Resources and Values	Desired Conditions	Attributes	Beneficial Influences	Detrimental Influences	Indicators	Target Value (= Desired Condition)	Current Condition	Target Met?
Wilderness (continued)			<ul style="list-style-type: none"> <li>practices, etc.)</li> <li>• Visitor use (can be positive if park visitors become park advocates)</li> <li>• Remote access and low density visitor use (reduces visitor pressure and impacts)</li> </ul>	<ul style="list-style-type: none"> <li>outbreaks, historic land practices, etc.)</li> <li>• Soil erosion/stability (as a result of developments and past land practices)</li> <li>• Air chemistry (pollutants and particulates)</li> <li>• Community composition, condition and trend (flora and fauna)</li> <li>• Predator control outside of the park ( park land cannot support constant sink effect by park animals occupying vacant territories outside of park)</li> <li>• Land use change outside of park</li> <li>• Visitor use (can be negative if visitor misuse occurs)</li> </ul>	2. # of unauthorized uses/adverse human acts (e.g. fire rings, wind breaks, cut limbs, hatchet marks, tree carvings) at campsites and along trail corridors	2. 0	2. Unknown	2. Unknown
					3. % change in length/width/# of social trails at destination features	3. 0% increase relative to baseline values	3. Unknown	3. Unknown
					4. Presence of exotic species	4. None	4. 29 forb/woody species and 20 grass species; 2 animal species	4. No
Natural Hydrologic Processes	<p>Surface water and groundwater are protected and water quality meets or exceeds all applicable water quality standards. Programs and facilities are maintained and operated to avoid pollution of surface water and groundwater.</p> <p>Watersheds are managed as complete hydrologic systems. This includes minimizing human-caused disturbance to the natural upland processes that deliver water, sediment, and woody debris to streams. Natural fluvial processes are allowed to proceed unimpeded, and stream processes that create habitat features are protected. Where stream manipulation is unavoidable, maximum use is made of techniques that are visually unobtrusive and that protect natural processes.</p> <p>Natural floodplain values are preserved or restored.</p> <p>The natural and beneficial values of wetlands are preserved and enhanced. A “no net loss of wetlands” policy is implemented, with an associated goal of net gain of wetlands through</p>	<ul style="list-style-type: none"> <li>• Wilderness character</li> <li>• Watershed integrity</li> <li>• Physical stream habitat</li> <li>• Geomorphic processes</li> <li>• Aquifer integrity</li> <li>• Aquatic biological integrity</li> <li>• Water quality</li> </ul>	<ul style="list-style-type: none"> <li>• Remote location</li> <li>• Top of the watershed</li> <li>• Fire effects</li> </ul>	<ul style="list-style-type: none"> <li>• Local development of groundwater resources</li> <li>• Poor design of hiking trails</li> <li>• Atmospheric deposition</li> <li>• Park waste management systems (septic, etc.)</li> <li>• Visitor use impacts</li> <li>• Drought</li> <li>• Fire effects</li> </ul>	1.Discharge	<i>Interim</i> 1. Smith Spring ≥ 8 gpm, Guadalupe Spring ≥ 5 gpm, Frijole Spring ≥ 2 gpm, Bone Spring ≥ 2 gpm, South McKittrick Creek (unknown), Choza Creek (unknown)	1. Smith Spring 8-48 gpm, Guadalupe Spring 5-7 gpm, Frijole Spring 2-4 gpm, Bone Spring 2-3 gpm, South McKittrick Creek (unknown), Choza Creek (unknown)	1.Yes (South McKittrick Creek and Choza Creek are unknown)
					2.Total nitrogen	2. ≤1 mg/L	2.Unknown	2.Unknown
					3.Total phosphorus	3. ≤ 18 µg/L	3.Unknown	3.Unknown
					4.Turbidity	4.≤ 4 FTU	4.Unknown	4.Unknown
					5.Benthic Index of Biological Integrity (BIBI)	5. ≥ 21 (High Aquatic Life Use)	5.Unknown	5.Unknown



Fundamental or Other Important Resources and Values	Desired Conditions	Attributes	Beneficial Influences	Detrimental Influences	Indicators	Target Value (= Desired Condition)	Current Condition	Target Met?
Natural Hydrologic Processes (continued)	the restoration of previously degraded wetlands.				score			
					6. Habitat Quality Index (HQI) score	6. ≥ 20 (High quality habitat)	6. Unknown	6. Unknown
Northern Chihuahuan Desert Biotic Communities; Natural Diversity (These communities include Chihuahuan desert scrub, semi-desert grassland, Great Basin conifer woodland, Madrean evergreen woodland, Rocky Mountain conifer forest, interior chaparral, interior riparian deciduous woodland, and gypsum dunes.)	The park is managed holistically, as part of a greater ecological, social, economic, and cultural system.	<ul style="list-style-type: none"> <li>Community composition, health, and integrity</li> <li>Rare species habitat characteristics (for listed species and species of management concern)</li> <li>Exotic species</li> </ul>	<ul style="list-style-type: none"> <li>Climate (aids seed set/bank)</li> <li>Disturbance regimes (flooding, wildfire, insect outbreaks, historic land practices, etc.)</li> <li>Visitor use (can be positive if park visitors become park advocates)</li> <li>Remote access and low density visitor use (reduces visitor pressure and impacts)</li> </ul>	<ul style="list-style-type: none"> <li>Exotic species (presence and distribution)</li> <li>Climate (drought, extreme fire)</li> <li>Disturbance regimes (flooding, wildfire, insect outbreaks, historic land practices, etc.)</li> <li>Soil erosion/stability (as a result of developments and past land practices)</li> <li>Air chemistry (pollutants and particulates)</li> <li>Community composition, condition and trend (flora and fauna)</li> <li>Predator control outside of the park ( park land cannot support constant sink effect by park animals occupying vacant territories outside of park)</li> <li>Land use change outside of park</li> <li>Visitor use (can be negative if visitor misuse occurs)</li> </ul>	1. % change in plant cover (distribution, % cover)	1. TBD (≤ xx %)	1. Unknown	1. Unknown
	All native plants and animals in the park are maintained as part of the natural ecosystem. Populations of native plant and animal species function in as natural condition as possible except where special considerations are warranted. Native species populations that have been severely reduced in or extirpated from the park are restored where feasible and sustainable.				2a. % change in species richness (plant and animal) (Note: List Lowe, Brown, and Pace species and Vital Signs species)	2.a. TBD (≤ xx %)	2.a. Unknown	2.a. Unknown
	Federal and state-listed threatened and endangered species and their habitats are protected and sustained. Native threatened and endangered species populations that have been severely reduced in or extirpated from the park are restored where feasible and sustainable.				2.b. % change in the # of severely reduced or extirpated species restored	2.b. 50% of severely reduced or extirpated species restored	2.b. 62 species are severely reduced or extirpated (a subset of Species of Management Concern GPRA goal)	2.b. No
	The management of populations of exotic plant and animal species, up to and including eradication, is undertaken wherever such species threaten park resources or public health and when control is prudent and feasible.				3. Presence of exotic species	3. None	3. 29 forb/woody species and 20 grass species; 2 animal species	3. No
	Natural resource management would emphasize preservation and restoration of ecosystem function, particularly in areas negatively impacted by visitor use and access. Where possible, fire would be allowed to resume its natural role in the park. [GMP preferred alternative]				4. % change in rate of large scale sheet erosion	4. TBD	4. Unknown	4. Unknown
					<i>Effects from nitrogen and sulfur deposition covered by indicators listed in Scenic Resources section</i>			
<b>CULTURAL RESOURCES</b>								
Archeological Resources	[All] Archeological sites are identified and inventoried, and their eligibility for listing in the National Register of Historic Places determined and documented. The qualities that contribute to the listing or eligibility for listing are protected in accordance with the <i>Archeology</i>	<ul style="list-style-type: none"> <li>Depositional Integrity</li> <li>Site Disturbance Level</li> <li>Threat or Disturbance Type</li> <li>Overall Condition</li> </ul>	<ul style="list-style-type: none"> <li>Trail design and visitor use controls</li> <li>In situ location of sites</li> <li>Education and</li> </ul>	<ul style="list-style-type: none"> <li>Natural weathering</li> <li>Erosion and rock falls</li> <li>Vegetation growth</li> <li>Exotic invasions</li> </ul>	1. Depositional integrity (as measured by the Archeological Site Condition Assessment Form criteria)	1. No sites scored as poor, lacking, unevaluated, or unknown	1. 1 well preserved, 1 poor, 395 unevaluated	1. No

Fundamental or Other Important Resources and Values	Desired Conditions	Attributes	Beneficial Influences	Detrimental Influences	Indicators	Target Value (= Desired Condition)	Current Condition	Target Met?
Archeological Resources (continued)	<p><i>and Historic Preservation: Secretary of the Interior's Standards and Guidelines.</i></p> <p>[All] Archeological sites are protected in an undisturbed condition unless it is determined through formal processes that disturbance or natural deterioration is unavoidable.</p>		<p>interpretive programs</p> <ul style="list-style-type: none"> <li>Limited access to archaeological sites.</li> <li>Majority of sites have limited surface expression.</li> <li>Entire park surveyed</li> <li>Planned fire</li> </ul>	<ul style="list-style-type: none"> <li>Pest infestations</li> <li>Visitor use</li> <li>Vehicular traffic (proximity to roads/trails)</li> <li>Park operations/maintenance</li> <li>Adjacent land uses</li> <li>Research sampling</li> <li>Wildlife damage</li> <li>Unauthorized collection</li> <li>Unplanned fire</li> </ul>	<p>2.Site disturbance level (as measured by the Archeological Site Condition Assessment Form criteria)</p> <p>3.Threat or disturbance type (as measured by the Archeological Site Condition Assessment Form criteria)</p> <p>4.Condition assessment summary (ASMIS)</p>	<p>2. Low</p> <p>3. All threat and disturbance types identified</p> <p>4. Condition assessments completed for all known sites</p>	<p>2. 41 low, 12 moderate, 51 not applicable, 3 severe, 428 undetermined (Figures exceed total number of recorded sites due to sites which may have multiple disturbances or threats)</p> <p>3. 393 identified, 3 undetermined, 1 none</p> <p>4. 99 of 396 sites assessed (62 = good; 31 = fair; 6 = poor; 292 = unknown; 5 = not relocated-unknown)</p>	<p>2. No</p> <p>3. No</p> <p>4. No</p>
Ranching Landscape	<p>[All] Historic structures are inventoried and their integrity and eligibility are evaluated under National Register of Historic Places criteria. The qualities that contribute to the listing or eligibility for listing of historic structures in the National Register of Historic Places are protected in accordance with the <i>Secretary of the Interior's Standards for the Treatment of Historic Properties: with Guidelines for Preserving, Rehabilitating, Restoring &amp; Reconstructing Historic Buildings.</i></p> <p>Cultural landscape inventories are conducted to identify landscapes potentially eligible for listing in the National Register of Historic Places. The management of cultural landscapes focuses on preserving the physical attributes, biotic systems, and use when that use contributes to their historical significance. The preservation, rehabilitation, restoration, or reconstruction of cultural landscapes is undertaken in accordance with <i>The Secretary of the Interior's Standards</i></p>	<ul style="list-style-type: none"> <li>Integrity: Structural, Historical, and Cultural Landscape</li> <li>Disturbance/threats</li> </ul>	<ul style="list-style-type: none"> <li>Visitor use controls</li> <li>Education and interpretive programs</li> <li>Limited access to most historic sites</li> <li>Planned fire</li> </ul>	<ul style="list-style-type: none"> <li>Natural weathering</li> <li>Erosion and rock falls</li> <li>Vegetation growth (some)</li> <li>Exotic invasions</li> <li>Pest infestations</li> <li>Visitor use</li> <li>Vehicular traffic (proximity to roads/trails)</li> <li>Park operations/maintenance</li> <li>Adjacent land uses</li> <li>Unauthorized collection</li> <li>Unplanned fire</li> </ul>	<p>1.List of Classified Structures (LCS) condition assessment)</p> <p>2.Cultural Landscape Inventory (CLI) condition rating</p> <p>3.Condition status as determined by Facility Condition Index (FCI) ratings entered into Facility Management Software System</p>	<p>1.No structures in poor condition</p> <p>2.No inventory unit in poor or unknown condition</p> <p>3.No facility in poor or serious condition</p>	<p>1. 2 of 14 structures listed in poor condition (Grisham-Hunter Tack Room and Williams Ranch Corral) (2006, 2007 data)</p> <p>2. 2 of 10 listed as fair or good condition [8 listed as unknown; Pinery Station = fair (2006); Frijole Ranch = good (2006)]</p> <p>3. 3 structures listed in poor or serious condition (Frijole bath house listed as poor with FCI = .327; Building 106 Pinery listed as poor with</p>	<p>1. No</p> <p>2. No</p> <p>3. No</p>

Fundamental or Other Important Resources and Values	Desired Conditions	Attributes	Beneficial Influences	Detrimental Influences	Indicators	Target Value (= Desired Condition)	Current Condition	Target Met?
Ranching Landscape (continued)	<p><i>for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes.</i></p> <p>Cultural resource management would emphasize preservation and rehabilitation of significant resources.</p> <p>Remnants of historic ranching activities in the backcountry zone would remain as discovery sites [GMP preferred alternative].</p>				(FMSS)		FCI = .285; Williams Ranch historic corrals listed as serious with FCI = .654)	
Wallace Pratt Properties	<p>[All] Historic structures are inventoried and their integrity and eligibility are evaluated under National Register of Historic Places criteria. The qualities that contribute to the listing or eligibility for listing of historic structures in the National Register of Historic Places are protected in accordance with the <i>Secretary of the Interior's Standards for the Treatment of Historic Properties: with Guidelines for Preserving, Rehabilitating, Restoring &amp; Reconstructing Historic Buildings.</i></p> <p>Cultural resource management would emphasize preservation and rehabilitation of significant resources.</p> <p>Remnants of historic ranching activities in the backcountry zone would remain as discovery sites [GMP preferred alternative].</p>	<ul style="list-style-type: none"> <li>• Integrity: Structural, Historical, and Cultural Landscape</li> <li>• Disturbance/threats</li> </ul>	<ul style="list-style-type: none"> <li>• Limited access except when park ranger present</li> <li>• Photographs of past condition and original blueprints available</li> <li>• Planned fire</li> </ul>	<ul style="list-style-type: none"> <li>• Natural weathering</li> <li>• Erosion and rock falls</li> <li>• Vegetation growth</li> <li>• Exotic invasions</li> <li>• Pest infestations</li> <li>• Visitor use</li> <li>• Vehicular traffic (proximity to roads/trails)</li> <li>• Park operations/maintenance</li> <li>• Adjacent land uses</li> <li>• Unauthorized collection</li> <li>• Unplanned fire</li> </ul>	1.LCS condition assessment	1.No structures in poor condition	1. 8 of 8 structures listed in better than poor condition (7 good, 1 fair) (2006, 2007 data)	1. Yes
					2. CLI condition rating	2.No inventory unit in poor or unknown condition	2. 1 of 1 listed as unknown	2. No
					3. Condition status as determined by FCI in FMSS	3.No facility in poor or serious condition	3. 1 structure listed in serious condition (Building 241 Pratt Garage listed as serious with FCI = .620)	3. No
Other Cultural Landscapes (including ethnographic resources)	<p>[All] Historic structures are inventoried and their integrity and eligibility are evaluated under National Register of Historic Places criteria. The qualities that contribute to the listing or eligibility for listing of historic structures in the National Register of Historic Places are protected in accordance with the <i>Secretary of the Interior's Standards for the Treatment of Historic Properties: with Guidelines for Preserving, Rehabilitating, Restoring &amp; Reconstructing Historic Buildings.</i></p> <p>Cultural landscape inventories are conducted to identify landscapes potentially eligible for listing in the National Register of Historic Places. The management of cultural landscapes focuses on preserving the physical attributes, biotic</p>	<ul style="list-style-type: none"> <li>• Integrity: Structural, Historical, and Cultural Landscape</li> <li>• Disturbance/threats</li> </ul>	<ul style="list-style-type: none"> <li>• Limited access to most sites</li> <li>• Cultural landscapes identified and documented</li> <li>• Planned fire</li> </ul>	<ul style="list-style-type: none"> <li>• Natural weathering</li> <li>• Erosion and rock falls</li> <li>• Vegetation growth (some)</li> <li>• Exotic invasions</li> <li>• Pest infestations</li> <li>• Visitor use</li> <li>• Vehicular traffic (proximity to roads/trails)</li> <li>• Park operations/maintenance</li> <li>• Adjacent land uses</li> <li>• Research sampling</li> <li>• Wildlife damage</li> <li>• Unauthorized collection</li> </ul>	1.LCS condition assessment	1.No structures in poor condition	1. 10 of 10 structures listed in better than poor condition (3 good, 7 fair) (2006, 2007 data)	1. Yes
					2. CLI condition rating	2.No inventory unit in poor or unknown condition	2. 1 good, 1 fair, 11 unknown	2.No
					3. Condition status as determined by FCI in FMSS	3.No facility in poor or serious condition	3. 17 of 21 structures in FMSS listed as fair or good condition (2 poor and 2 serious, see previous rows)	3.No



Fundamental or Other Important Resources and Values	Desired Conditions	Attributes	Beneficial Influences	Detrimental Influences	Indicators	Target Value (= Desired Condition)	Current Condition	Target Met?
Other Cultural Landscapes (continued)	<p>systems, and use when that use contributes to their historical significance. The preservation, rehabilitation, restoration, or reconstruction of cultural landscapes is undertaken in accordance with <i>The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes</i>.</p> <p>The park is managed holistically, as part of a greater...social and cultural system. Appropriate cultural anthropological research is conducted in cooperation with groups associated with the park. All ethnographic resources listed in the National Register of Historic Places or determined eligible for listing are called traditional cultural properties and are protected through tribal consultation.</p> <p>Cultural resource management would emphasize preservation and rehabilitation of significant resources.</p> <p>Remnants of historic ranching activities in the backcountry zone would remain as discovery sites [GMP preferred alternative].</p>			<ul style="list-style-type: none"> <li>• Unplanned fire</li> </ul>				
Museum Collections and Archives	<p>All museum collections (objects, artifacts, specimens, and manuscript collections) are identified and inventoried, catalogued, documented, preserved, and protected. Provision is made for access to and use of items in the collections for exhibits, research, and interpretation. The qualities that contribute to the significance of collections are protected in accordance with established standards.</p>	<ul style="list-style-type: none"> <li>• Protection and preservation</li> <li>• Condition (completeness and condition)</li> </ul>	<ul style="list-style-type: none"> <li>• Restricted access to specimens and museum records</li> <li>• Backup data sets in various locations</li> <li>• Climate controlled environment for many specimens</li> <li>• Access to collections for interpretive and research purposes</li> </ul>	<ul style="list-style-type: none"> <li>• Improper storage</li> <li>• Long delays between accessioning and cataloging</li> <li>• Insect activity</li> <li>• Lack of regular maintenance/conservation</li> </ul>	<p>1.ANCS+ standards</p> <p>2.Random sample inventory (completeness and condition)</p> <p>3.Controlled property inventory (completeness and condition)</p> <p>4.% completeness of photographic documentation</p>	<p>1.% of applicable standards met</p> <p>2. 100 % complete (all objects accounted for) and no deterioration of specimens</p> <p>3. 100 % complete (all objects accounted for) and no deterioration of specimens</p> <p>4. 100%</p>	<p>1.78% of applicable standards met (2001 data)</p> <p>2. 100 % complete and no change documented</p> <p>3. 100 % complete and no change documented</p> <p>4. TBD</p>	<p>1. No</p> <p>2. Yes</p> <p>3. Yes</p> <p>4. No</p>

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## COMPREHENSIVE STRATEGIES TO ACHIEVE DESIRED CONDITIONS

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Comprehensive strategies are a sequence of activities or actions based on adequate science and scholarship that enables the park to achieve or maintain desired conditions for the affected resource. Comprehensive strategies were developed by first examining the difference between current conditions and desired conditions. The comprehensive strategies were designed to “bridge the gap” where gaps in condition existed. Next, a logical sequence of activities was designed to attain desired conditions in a reasonable time frame. The activities focus on acquiring data and improving resource knowledge, investigating resource management and enhancement projects, and monitoring resource condition over time.

The comprehensive strategies are presented in graphic form, using a table to create a 20-year timeline. There is no specific calendar or fiscal year identified for a comprehensive strategy, because the timeline suggests a sequence of logical steps and not activity programming for any one year. In order to create this timeline, the timing and priority of each of the comprehensive strategies was evaluated and determined. Appendix F contains a more detailed description of the comprehensive strategies, including their timing and priority assignments.

Some related and contingent activities appear on a single line. Most activities appear on separate lines. Each comprehensive strategy contains activities that do not indicate a specific course of action, unless compliance has been completed. No specific undertakings or actions are suggested at this level of planning. Potential funding sources are identified, but are not exclusive of other opportunities. The relationship between park budgets and funding the resource stewardship strategy is explained in the section on “Funding the Comprehensive Strategies.”

### RELATIONSHIP OF COMPREHENSIVE STRATEGIES TO PARK RESOURCES AND INDICATORS

The comprehensive strategies included in this resource stewardship strategy are organized according to the park’s major resource types (geologic, scenic, natural, and cultural resources). These resource types are directly related to those resources that were identified as the park’s fundamental and other important resources and values (see section titled “Park Purpose, Significance, and Fundamental and Other Important Resources and Values”). The indicators selected are directly related to the primary attributes of a resource that can be measured to determine the condition of park resources. The comprehensive strategies are designed to address all deficiencies and needs in the park’s resource management program. For example, the strategies include activities that investigate and acquire resource knowledge, assess and document resource condition, mitigate resource stressors, formulate plans for resource management, and develop partnerships to monitor and enhance resources. Together, these comprehensive strategies provide the park with a road map that should enable park staff to pursue the activities and actions that will be required to achieve or maintain desired conditions.

### COMPREHENSIVE STRATEGIES - ACTIVITIES AND TIMELINES

The following section contains tables and timescales that represent the comprehensive strategies that the park will implement to achieve or maintain desired resource conditions.

Each of the park's major resource types is addressed with a detailed description of the comprehensive strategy, including its activity number, timing, and priority (see tables 8a, 9a, 10a, 11a). The timing and priority were assigned using the following definitions and criteria.

**Timing** = how long it will take to accomplish an action or activity.

- **Short-term (S)** actions can be initiated immediately and can be accomplished in 1-3 years.
- **Mid-term (M)** actions take between 4-10 years to accomplish and may not be able to be initiated immediately.
- **Long-term (L)** actions take longer than 10 years to complete once they have been started. Often times these activities cannot be started for a number of years.
- **Ongoing (O)** actions involve more routine tasks or projects that take place at regular intervals over time.

**Priority** = the importance of the activity. It is often evaluated according to criteria such as: urgency; relevance to mission, park significance, and fundamental resources and values; legal requirements; community need/public interest; budget and personnel.

- **High priority (1)** actions should be accomplished first. These activities are considered extremely important to the protection of park resources and values. High priority actions are directly related to the accomplishment of other comprehensive strategies.
- **Medium priority (2)** actions are considered important, but not urgent, and meet a combination of other resource objectives.
- **Low priority (3)** actions are important, but not critical to resource protection and management needs. Low priority actions items do not have to be completed in the immediate future and primarily fulfill only one comprehensive strategy.

Each of the comprehensive strategies is represented graphically using a 20-year timescale (see tables 8b, 9b, 10b, 11b). These timescale tables serve as a workplan for implementing the RSS. The numbers listed with each of the activities in the timescale correspond to the activity number identified in each of the preceding tables. Potential funding sources are identified and displayed for the activities so that park staff can develop partnerships that support successful implementation of the strategies. The fund sources are also used as an assumption for the cost estimating and budget information presented later in this chapter.

Table 7 includes a summary of plans, studies, and reports needed over a 20-year timeframe.

Tables 12a and 12b address activities needed for coordination and implementation of the park's overall resource management program – the activities are not specific to any one resource type.



**Table 7. Plans, studies, reports, and inventories needed (compiled from all resource categories)**

See end of table for color key

		Year																							
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028				
Natural Resources	23 - Cave inv.																								
	56 - Submit request for sound inventory and complete baseline inventory																								
	61, 64 - Unauthorized human uses inventory																								
	18 - Soils inventory and map																								
	43, 44 - Submit request for viewshed analysis and identify critical viewsheds																								
	87 - Fire mgmt. plan																								
	52 - Night sky inventory																								
	190 - Exotic vegetation mgmt. plan																								
	191 - Mountain lion-visitor safety mgmt. plan																								
	189 - Aoudad removal plan/EIS																								
	11 - Geological resources mgmt. plan																								
	26 - Cave mgmt. plan																								
	80 - IPM plan																								
	192 - DCP for west side (addition)																								
	20 - Dune mgmt. plan																								
60 - Backcountry/wilderness mgmt. plan																									

Table 7. Plans, studies, reports, and inventories needed (continued)

		Year																							
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028				
<b>Natural Resources</b>					29 - Cave paleo resource inventory																				
					22 - Groundwater inventory																				
					77, 78 - Water resources mgmt. plan																				
							67 - Wetlands and riparian area inventory																		
								42 - Land protection plan																	
								24 - Survey unexplored areas and complete park-wide cave inventory																	
											16 - Geologic mapping of west side (addition)														
												92a - Bighorn sheep reintroduction plan													
																Wilderness study/recommendation									
								1 - Paleo inventory																	
							96, 97, 98, 99 - Biological resource inventories																		
<b>Cultural Resources</b>	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date	RSS Review/Up date				
	156 - Historic Resource Study																								
	151 - Frijole Ranch DCP																								
	136 - Historic Structures Preservation Guide																								
	128 - CLI for Ship-On-the-Desert																								
137 - NR nomination for Pratt properties																									

Table 7. Plans, studies, reports, and inventories needed (continued)

		Year																				
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	
Cultural Resources	166b - Complete museum collection emergency preparedness plan																					
				134 - Cultural landscape mgmt. plans for Williams Ranch, Hunter Line Cabin, SOD, and Pratt Cabin																		
				131 - CLRs for SOD and Pratt Cabin																		
				166a - Update museum collections mgmt. plan																		
				117 - Review and update CLIs, CLRs, HSRs, and HSPGs						117 - Review and update CLIs, CLRs, HSRs, and HSPGs						117 - Review and update CLIs, CLRs, HSRs, and HSPGs					117 - Review and update CLIs, CLRs, HSRs, and HSPGs	
					168 - Archive assessment and mgmt. plan																	
						129 - CLIs for Williams Ranch, Hunter Line Cabin, and Bowl Cabin																
					152 - Interpretive exhibit plan for Frijole Ranch House																	
						132 - CLR for Pinery																
						135 - HSRs for Frijole Ranch, Williams Ranch, Hunter Line Cabin, SOD, and Pratt Cabin																



Table 7. Plans, studies, reports, and inventories needed (continued)

		Year																				
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	
<b>Cultural Resources</b>								133 - CLRs for Williams Ranch and Hunter Line Cabin														
								115 - Rock art mgmt. plan														
									138 - NR nominations for other properties listed as eligible in LCS & CLI													
														114 - CLI for McKittrick Canyon arch. district								
																	130 - CLIs for Dog Canyon mining, Pine Springs store, Butterfield Stage Route/Emigrant trail					

<b>Potential Funding Sources</b>	Centennial Challenge	ONPS - Park Base	Servicewide Comprehensive Call (SCC)	Chihuahuan Desert Network (CHDN) I&M	Line Item Construction	Fire Program	Partnership (NPS)	Partnership (Non-NPS)
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Table 8a. Descriptions of comprehensive strategies for geologic resources

ACTIVITY NUMBER	COMPREHENSIVE STRATEGY	TIMING	PRIORITY	PARTNER-SHIP
<b>GEOLOGIC RESOURCES</b>				
<b>Capitan Reef and Related Deposits &amp; Western Escarpment Geological Section</b>				
1	Activity: Continue to inventory and field map unexplored areas for paleo resources (complete park-wide inventory), including use of photogrammetry to document in-situ resources.	O	1	Y
2	Activity: Continue to monitor known paleolocalities using paleolocality condition assessment form and photogrammetry.	O	1	
3	Activity: Cyclic and mitigative collecting of paleo resources at localities where actual loss exceeds target values.	O	2	
4	Activity: Implement best management practices to control unnatural rates of erosion affecting paleo resources where actual loss exceeds target values.	O	2	
5	Activity: LE patrols of localities being illegally collected where actual loss exceeds target values.	O	2	
6	Activity: Plan paleo protection strategies to incorporate into trail management plan.	S	1	
7	Activity: Document park specimens and localities held by other institutions (includes historic collections and published materials).	O	1	Y
8	Activity: Develop photodocumentation protocols (SOPs) for in-situ and museum paleo collections.	S	1	
9	Activity: Inventory and assess the effects of historic stream impoundment structures on geologic resources and other natural resources.	M/L	3	Y
10	GMP Policy Action: Partner with the U.S. Geological Survey and others to identify, address, and monitor geologic hazards.	M/L	3	Y
11	Activity: Develop geological resources management plan - includes plans for global stratotype sections and points (GSSP) management and access.	S	1	Y
12	GMP Policy Action: Update geologic map of the park in digital format that can be used in the park's geographic information system (GIS).	O	2	Y
13	GMP Policy Action: Prepare and maintain a geologic inventory, including the identification of the significant geologic processes that shape park ecosystems and the identification of the human influences on those geologic processes (i.e., "geoindicators"); identification of geologic hazards; inventory of type sections or type localities within the park; inventory of "text- book" localities that provide particularly good or well-exposed examples of geologic features or events, and that may warrant special protection or interpretive efforts; and, identification of interpretive themes or other opportunities for interpreting the significant geologic events or processes that are preserved, exposed, or occur in the park. [See PMIS 125276]	O	1	

14	GMP Policy Action: Prepare and maintain a geology/paleontology site layer for the park's GIS (i.e., database of fossil localities that have been excavated or are known to contain fossils).	O	1	
15	GMP Policy Action: Partner with federal, state, and local agencies and with academic institutions to conduct paleontological research and to identify significance of geology and paleo resources.	O	2 (1)	Y
16	Activity: Complete geologic mapping of west side (addition).	L	2	Y
<b>Salt Basin/Dunes</b>				
17	Activity: Acquire orthophotos at resolution adequate to monitor changes in dune system.	S/O	2	Y
18	Activity: Complete soils map.	M	1	Y
19	Activity: Determine natural range of variability of dune movement.	L	2	
20	Activity: Develop a dune management plan.	M	1	Y
21	GMP Action: Design and implement a groundwater monitoring program for the west side of the park (begin implementation); coordinate with CHDN and WQQ protocol.	S/O	1	Y
22	GMP Action: Inventory water resources to establish baseline (incl. determining depth to groundwater).	L	2	Y
<b>Caves and Karst</b>				
23	Activity: Reinventory known caves.	S	1	Y
24	Activity: Continue to explore unexplored areas for cave resources (complete park-wide cave inventory).	L/O	3	
25	Activity: Protect cave locations - geocaching, public access issues (research or speleological mapping projects), public safety, protect paleo resources.	O	2	
26	Activity: Update/develop new Cave Management Plan (including biotic component).	M	2	Y
27	Activity: Update existing cave database - make sure database is current.	O	2	
28	Activity: Continue wet deposition - NADP monitoring.	O	1	Y
29	Activity: Inventory paleo resources in caves.	M	3	
30	GMP Action: Maintain the existing cave permitting system to regulate, control and restrict cave access.	O	2	
<b>Museum Collections</b>				
31	Activity: Catalog collected and salvaged specimens of significance and complete data entries into park geology database and ANCS+.	O	2	



Table 8b. Comprehensive strategies for geologic resources

See end of table for color key

		Year																					
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028		
<b>Paleo Resources</b>	6 - Paleo protection in trail mgmt. plan																						
	8 - Photodocumentation protocol for paleo resources																						
	9 - Assess impacts of stream impoundments and respond																						
	1 - Survey unexplored areas and complete park-wide paleo inventory and mapping																						
	3, 4, 5 - Where actual loss exceeds target values...complete cyclic and mitigative collecting, erosion control, and LE patrols																						
	14 - Maintain GIS layer of paleo sites																						
	15 - Partner to conduct paleo research																						
	31 - Catalog specimens and maintain database and ANCS+																						
	7 - Document park specimens and localities held by other institutions (historic collections and published materials)																						
	2 - Monitor and assess condition of known paleo localities																						
<b>Caves</b>	23 - Reinventory known caves																						
	29 - Cave paleo resource inventory																						
	26 - Cave mgmt. plan																						
	24 - Survey unexplored areas and complete park-wide cave inventory																						
	25 - Protect cave locations																						
	27 - Update and maintain cave database																						
30 - Maintain cave permitting system																							
<b>Soils and Geologic Resources</b>	18, 85, 86 - Soils map																						
	13 - Geologic inventory						13 - Geologic inventory						13 - Geologic inventory						13 - Geologic inventory				
	17 - Salt Basin dune analysis							17 - Dune analysis						17 - Dune analysis						17 - Dune analysis			
	11 - Geological resources mgmt. plan																						

Table 8b. Comprehensive strategies for geologic resources (continued)

		Year																					
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028		
<b>Soils and Geologic Resources</b>				10 - Partner with USGS on geologic hazards																			
				19 - Determine natural range of variability of dune movement																			
				20 - Dune mgmt. plan																			
											16 - Geologic mapping of west side (addition)												
				12 - Update geologic map						12 - Update geologic map						12 - Update geologic map						12 - Update geologic map	
<b>Groundwater Resources</b>		22 - Inventory water resources and characterize aquifers																					
			21 - Groundwater monitoring program																				
			28 - Wet deposition-NADP monitoring																				
<b>Potential Funding Sources</b>	Centennial Challenge	ONPS - Park Base	Service-wide Comprehensive Call (SCC)	Chihuahuan Desert Network (CHDN) I&M	Line Item Construction	Fire Program	Partnership (NPS)	Partnership (Non-NPS)															

Table 9a. Descriptions of comprehensive strategies for scenic resources

ACTIVITY NUMBER	COMPREHENSIVE STRATEGY	TIMING	PRIORITY	PARTNER-SHIP
<b>SCENIC RESOURCES</b>				
<b>Unobstructed Views (Visibility, Air Quality, and Scenic Vistas)</b>				
32	Activity: Monitor air quality using IMPROVE and NADP protocols. Monitor nitrate and sulfate. Coordinate and partner with NPS Air Resources Division, University of Texas (Austin, El Paso), and Texas Commission on Environmental Quality (TCEQ).	O	1	Y
37	Activity: Educate the public and public officials about impacts on visibility, viewsheds, night skies and soundscapes. Coordinate with NPS ARD, BIBE, TCEQ.	O	2	Y
39	Activity: Assess and reduce impacts from park development, operations and visitor use on visibility, viewsheds, night skies and soundscapes (incl. a dust abatement program).	S/O	1	
41	Activity: Assess and reduce carbon-footprint of the park.	O	2	
42	Activity: Revise/update land protection plan.	M	3	
43	Activity: Identify critical viewsheds in need of protection using GIS modeling. Investigate Blueridge Parkway and Appalachian Trail for viewshed analysis tools and techniques.	S	2	
44	GMP Policy Action: Work collaboratively with the landowners inside and outside the park and utility companies (e.g. phone, electric, wind, pipeline) to protect viewsheds leading into and in the park and seen from inside the park. Use cooperative agreements, conservation easements, donation, land exchanges, cooperatively produced management plans, or other tools to accomplish the protection of the views.	O	1	
45	Activity: Assess influence of contrails. Initiate discussions with FAA about impacts, altering flight paths, limiting overflights.	M	3	Y
47	GMP Policy Action: Monitor and document the condition of air quality and related values.	O	1	Y
48	GMP Policy Action: Minimize air quality pollution emissions associated with park operations, including the use of prescribed fire and visitor use activities.	O	2	
49	GMP Policy Action: Maintain constant dialogue with the Texas Commission on Environmental Quality regarding visibility conditions at the park.	O	1	
50a	GMP Policy Action: Participate with the NPS-WASO Air Resources Division on the regional planning group that includes Texas Commission on Environmental Quality that was formed to address regional haze issues in the central United States.	S	2	Y
50b	Activity: Work with TCEQ on installing nephelometer and pursue a cooperative agreement for its operation.	S		
50c	Activity: Negotiate with TCEQ to re-activate visibility webcam.	S	2	Y
<b>Wilderness Character (Dark Night Skies and Natural Sounds)</b>				
51	Activity: Develop protocol for inventory and monitoring of night sky brightness through consultation with Night Sky Team (NPS Air Resources Division).	S	1	Y

52	Activity: Complete night sky baseline condition assessment (Night Sky Team FY10).	M	2	Y
53	Activity: Monitor and analyze night skies for zenith brightness (magnitudes per arcsecond), total sky brightness, individual light dome brightness and Bortle class. Partner with McDonald Observatory, UT-EP.	M/O	1	Y
54	GMP Policy Action: The National Park Service will work to reduce or eliminate the impacts of artificial outdoor lighting on the park's night skies. The NPS will evaluate park facilities and operations and cooperate with park visitors, neighbors, and local government agencies to minimize external impacts.	O	2	Y
55	Activity: Develop protocol for inventory and monitoring of anthropogenic sound frequency, duration and decibel level. Contact NPS ARD Natural Sounds Program and acquire assessment protocol from Zion.	S	1	Y
56	Activity: Submit Technical Assistance Request to WASO-ARD for baseline sound inventory and complete inventory.	S	1	Y
57	Activity: Monitor and analyze data from soundscape assessment.	M/O	2	Y
58a	GMP Policy Action: Work with the Department of Defense to address problems from military flights.	O	1	Y
58b	GMP Policy Action: Work with the Federal Aviation Administration to have commercial flight paths routed south of park wilderness.	L/O	1	Y
59	GMP Policy Action: Encourage visitors to avoid unnecessary noise, such as through the use of generators and maintaining quiet hours in the campgrounds.	O	1	
60	Activity: Revise/update Backcountry/Wilderness Management Plan (including addressing soundscape and night sky issues and concerns).	M	2	



Table 9b. Comprehensive strategies for scenic resources

See end of table for color key

		Year																				
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	
<b>Natural Sounds</b>	56 - Submit request for sound inventory																					
	55 - Protocol for sound monitoring																					
					45 - Commercial overflight assessment																	
			57 - Monitor and analyze sound data		57 - Monitor and analyze sound data		57 - Monitor and analyze sound data		57 - Monitor and analyze sound data		57 - Monitor and analyze sound data		57 - Monitor and analyze sound data		57 - Monitor and analyze sound data		57 - Monitor and analyze sound data		57 - Monitor and analyze sound data		57 - Monitor and analyze sound data	
								58b - Coordinate w/ FAA on impact of commercial flights on park soundscape														
								58a - Coordinate w/ DOD on impact of military flights on park soundscape														
								59 - Work with park visitors to reduce human-generated noise														
<b>Visibility &amp; Night Skies</b>	50c - Activate park visibility webcam																					
	51 - Protocol for night sky monitoring																					
		52 - Night sky baseline inventory																				
		50b - Cooperative agmt. and installation of nephelometer																				
						60 - Revise BWMP to include soundscape and night sky																
							53, 54 - Monitor/analyze night sky data and minimize park's light pollution															
					41 - Evaluate fleet/park ops. and reduce emissions					41 - Evaluate fleet/park ops. and reduce emissions						41 - Evaluate fleet/park ops. and reduce emissions					41 - Evaluate fleet/park ops. and reduce emissions	
								32, 47, 48 - Monitor air quality (PM2.5, PM 10, sulfate, nitrate) and minimize pollution from park operations														
								37, 44, 49, 50a - Coordination and education/outreach on visibility, viewshed protection, night skies, and soundscapes														

**Table 9b. Comprehensive strategies for scenic resources (continued)**

		Year																			
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
<b>Viewsheds</b>	39 - Review of park operations impact on scenic resources				39 - Scenic resource review			39 - Scenic resource review			39 - Scenic resource review			39 - Scenic resource review			39 - Scenic resource review			39 - Scenic resource review	
		43, 44 - Submit request for viewshed analysis and identify critical viewsheds																			
									42 - Land protection plan												

<b>Potential Funding Sources</b>	Centennial Challenge	ONPS - Park Base	Servicewide Comprehensive Call (SCC)	Chihuahuan Desert Network (CHDN) I&M	Line Item Construction	Fire Program	Partnership (NPS)	Partnership (Non-NPS)

Table 10a. Descriptions of comprehensive strategies for natural resources

ACTIVITY NUMBER	COMPREHENSIVE STRATEGY	TIMING	PRIORITY	PARTNERSHIP
<b>NATURAL RESOURCES</b>				
61, 64	Activity: Reassess (re-visit) the 1998 backcountry campsites assessment and add documentation of presence or absence of exotic plants. Complete inventory of unauthorized human uses (e.g. windbreaks, out-of-bounds camping, vandalism marks) to establish baseline, and establish protocols for appropriate mitigation. Inventory and assess the condition of social trails.	S	1	
62	Activity: Formalize appropriate trails and incorporate them into the system; rehabilitate undesired disturbances.	M	3	Y
<b>Natural Hydrologic Processes</b>				
66	Activity: Initiate monitoring of water quality and quantity indicators per WQQ protocol and additional park specific parameters (discharge, turbidity, nitrogen and phosphorus, HQI, IBI). Partners are TCEQ and CHDN.	O	1	Y
67a	Activity: Validate (re-affirm) park-wide wetlands and riparian inventories.	M	2	Y
67b	Activity: Complete condition assessments on wetlands and riparian areas.	M	2	Y
68	Activity: Compile known water quality data from NPS-WRD, TCEQ, partner universities, etc. Design data management structure for data capture/retention. [See PMIS 107571]	S	2	Y
69	Activity: Assess springs by adopting Big Bend National Park qualitative spring assessment program. Incorporate park legacy data into spring and water quality database to establish historic conditions.	S	1	Y
70	GMP Mitigation Measure: Build a runoff filtration system to minimize water pollution from larger parking areas.	M	2	
71	GMP Mitigation Measure: Continue to remove horse manure from the park operations corrals daily to reduce the potential for water quality impacts associated with nonpoint source pollution. Park staff will also remove horse manure from public corrals if visitors fail to do so.	O	2	
72	Activity: Establish water quality baseline from existing water chemistry data. [See PMIS 107571]	S	2	
73	GMP Policy Action: Determine minimum flow needs to sustain aquatic life.	L	2	Y
74	GMP Policy Action: Continue to monitor water flows and quality at selected springs and seeps and in McKittrick Canyon.	O	2	
75	GMP Policy Action: Work with regional water planning entities and with underground water conservation districts to manage groundwater.	M/O	1	Y
76	GMP Policy Action: Develop a groundwater monitoring strategy and monitor selected wells to determine the effects of water mining from adjacent areas on the park's groundwater and aquifers.	S/O	1	
77	GMP Policy Action: Develop and implement a water resources management plan for the park.	M	1	Y

78	GMP Policy Action: Develop a monitoring plan to monitor the effects of visitor use on water resources, especially in McKittrick Canyon and at selected springs.	M	2	Y
183	Activity: Habitat characterization for McKittrick Creek, Choza Creek, and other perennial seeps and springs.	M	2	Y
184	Activity: Establish benthic index of biological integrity for McKittrick Creek (including macro-invertebrates).	M/O	2	Y
185	Activity: Riparian assessment of McKittrick Creek.	M	2	Y
186	Activity: Evaluate compatibility of park developed areas and proposed development with the affected floodplains.	S	2	Y
187	Activity: Climate change scenario planning.	M	3	Y
188	Activity: Assessment of existing water rights.	S	1	Y
<b>Northern Chihuahuan Desert Biotic Communities; Natural Diversity</b>				
189	Activity: Aoudad removal plan/EIS.	S	1	Y
190	Activity: Exotic vegetation management plan.	S	2	
79	Activity: Survey exotic plants in the park. Update GIS to monitor progress of treatment or expansion. Goal is backcountry trail corridors by year 3.	S/O	1	
80	Activity: Update and expand the integrated pest management plan.	M	1	
81	GMP Action: Develop and implement exotic plant and animal management plan.	O	1	
82	Activity: Review and assess annual report for wet deposition (potential partnership with TCEQ).	O	2	Y
83	Activity: Continue to monitor and use data to analyze the impacts of external projects that may cause or increase acid deposition in the park.	O	2	
84	Activity: Complete assessment of areas of large-scale erosion believed to be anthropogenic in origin.	L	2	Y
85, 86	Activity: Complete soil survey to characterize the productivity and erodability of park soils. Develop current soils map of the park in digital format for the park's GIS.	M	1	Y
87	GMP Policy Action: Maintain and implement a current fire management plan to reflect changes in wildland fire policy, fire use applications, and the body of knowledge on fire effects within the park's vegetation types.	O	1	
88	Activity: Maintain current GIS layer on fire history. Populate attribute table with associated known fire behavior and weather.	O	2	Y
89	GMP Policy Action: Maintain a cooperative agreement for fire suppression with appropriate federal, tribal, state, and local agencies and organizations.	O	1	Y
90	GMP Policy Action: Conduct research and monitor the effects of fire to ensure that resource objectives are met.	S/O	2	Y
91	Activity: Habitat assessment and partnerships with local landowners and others to assess feasibility of reestablishing extirpated species.	M	2	Y
92a	Activity: Develop desert bighorn sheep re-introduction plan.	L	2	
92b	GMP Action: Native species populations that have been severely reduced or extirpated from the park, such as desert bighorn sheep, American pronghorn, and black-tailed prairie dogs, would be restored where feasible and sustainable.	M/L	2	



93	Activity: Develop vegetation classification map which will be connected to soil and vegetation I & M protocol. Incorporate into park GIS.	S	1	Y
94	Activity: Identify key focal species for each biotic community to indicate unacceptable levels of change. Define desired conditions. Consider species from cluster analysis from GUMO vegetation map.	M	1	Y
95a	Activity: Develop experimental population of Guadalupe violet for future planting. Includes working with CESU cooperating researchers to experiment with germination and transplant methods. Collect and analyze data from field sites.	S	1	Y
95b	Activity: Monitoring of transplanted Guadalupe violet population.	O	2	Y
96	Activity: Complete biological resource inventories (incl. caves, gypsum dunes, and non-vascular plants).	O	1	
97	Activity: Conduct all-taxa biodiversity inventory (Bio-blitz); coordinate with WHSA.	M	3	
98	GMP Policy Action: Complete an inventory of plants and animals in the park and regularly monitor the distribution and condition of selected species that are indicators of ecosystem condition and diversity. Maintain data in GIS and appropriate park or WASO databases.	L	2	
99	GMP Policy Action: Complete an inventory of rare or protected plants and animals in the park and regularly monitor the distribution and condition. Maintain data in GIS and appropriate park or WASO databases. Modify management plans to be more effective based on the results of monitoring.	L	2	
102	GMP Policy Action: Restore lands previously disturbed by human impact.	O/L	3	
103	Activity: Establish monitoring protocol and conduct inventory, monitoring, and population viability assessments for species of management concern (to include species for GPRA reporting and those on federal, state, or conservation organization watchlists).	S/O	2	
104	Activity: Implement vital signs monitoring to monitor long-term ecological change.	L/O	1	Y
105	GMP Policy Action: Complete a vegetation map for the park.	S	1	Y
106	GMP Policy Action: Map and monitor critical habitat for selected species.	M/O	2	Y
107a	Activity: Assess and cultivate partners to develop a research program on the effects of acid rain.	M	2	Y
107b	GMP Policy Action: Design and implement an acid rain effects research program. Participate in research on air quality and effects of air pollution. Determine changes in ecosystem function caused by atmospheric deposition and assess the resistance and resilience of native ecosystems in the face of these external perturbations.	L	3	Y



Table 10b. Comprehensive strategies for natural resources

See end of table for color key

		Year																			
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Water Resources	68 - Compile water quality data																				
	69 - Evaluate BIBE spring assessment protocol and assess springs																				
	186 - Evaluate park development and floodplain																				
	188 - Assessment of existing water rights																				
	72 - Establish water quality baseline																				
	70 - Construct parking runoff filtration system																				
	67a - Validate wetlands and riparian inventory																				
	77, 78 - Water resources mgmt. plan																				
	187 - Conduct climate change scenario planning																				
	73 - Determine minimum water flow for aquatic life																				

Table 10b. Comprehensive strategies for natural resources (continued)

		Year																						
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028			
<b>Water Resources</b>								183 - Habitat characterization for McKittrick and Choza Creeks (plus other seeps/springs)																
								184 - Establish benthic index of biological integrity for McKittrick Creek																
								185 - Riparian assessment of McKittrick Creek																
								67b - Wetlands and riparian area condition assessments																
	66, 74 - Monitoring of surface water quality indicators (discharge, turbidity, nitrogen and phosphorous, HQI, IBI)																							
	71 - Daily horse manure removal and BMPs																							
	75 - Coordinate with regional water districts																							
	76 - Groundwater monitoring																							
	<b>Vegetation</b>	95a - Guadalupe violet experimental population																						
		93, 105 - Vegetation map																						
							95b - Guadalupe violet monitoring				95b - Guadalupe violet monitoring				95b - Guadalupe violet monitoring				95b - Guadalupe violet monitoring					
98 - Monitor plants and animals that indicate ecosystem health																								
99 - Monitor rare or protected plants and animals																								
							107a - Assess and cultivate partners for acid rain effects research program																	
							107b - Design and implement acid rain effects research program																	
79 - Exotic plant inventory and monitoring																								
82, 83 - Review/assess annual report for wet deposition; coordinate w/ TCEQ.																								
<b>Wildlife</b>		189 - Aoudad removal plan/EIS																						
			97 - BioBlitz				97 - BioBlitz				97 - BioBlitz				97 - BioBlitz				97 - BioBlitz					



Table 10b. Comprehensive strategies for natural resources (continued)

		Year																				
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	
<b>Wildlife</b>						91 - Habitat assessment and external partnerships for species reintroductions																
								92b - Re-introduce American pronghorn, desert bighorn sheep, and black-tailed prairie dogs to park														
<b>Integrated</b>		61, 64 - Re-assess backcountry campsites; ID social trails																				
					80 - IPM plan																	
					62 - Formalize trails and rehabilitate others																	
					104 - Monitoring protocols for Vital Signs																	
					94 - Focal species for each community																	
							84 - Assess large-scale erosion															
			81 - Develop and implement exotic plant and animal management plan																			
			96, 98, 99 - Biological resource inventories																			
			102 - Restore disturbed lands																			
			103, 106 - Establish monitoring protocol and conduct inventory, monitoring, and population viability assessments for species of management concern; map and monitor critical habitat for selected species																			
<b>Fire Management</b>		87 - Update fire mgmt. plan					87 - Update fire mgmt. plan						87 - Update fire mgmt. plan					87 - Update fire mgmt. plan				
		88 - Maintain GIS layer on fire history																				
		89 - Maintain current cooperative agreement for fire suppression																				
		90 - Fire effects monitoring and research																				
<b>Potential Funding Sources</b>	Exotic Plant Management Team (EPMT)	ONPS - Park Base	Service-wide Comprehensive Call (SCC)	Chihuahuan Desert Network (CHDN) I&M	Line Item Construction	Fire Program	Partnership (NPS)	Partnership (Non-NPS)														



Table 11a. Descriptions of comprehensive strategies for cultural resources

ACTIVITY NUMBER	COMPREHENSIVE STRATEGY	TIMING	PRIORITY	PARTNER-SHIP
<b>CULTURAL RESOURCES</b>				
<b>Archeological Resources</b>				
109a	Activity: Complete section 110 inventory of prehistoric and historic archeological resources to meet 100% survey level (GMP) complete with National Register nomination as appropriate.	L/O	2	
109b	Activity: Complete and submit National Register nominations for eligible historic and prehistoric properties.	L/O	2	
110	Activity: Revisit arch. sites with missing or incomplete data.	M	1	
111	Activity: Perform periodic condition assessments and document efforts to protect sites.	O	1	
112	Activity: Maintain the ASMIS data base.	O	2	
114	Activity: Complete CLI for McKittrick Canyon archeological district.	L	3	
115	Activity: Develop a rock art management and monitoring plan, including data management protocol, based on current rock art inventory and assessment data.	M	2	
117	Activity: Review and update or revise CLIs, CLRs, HSRs, and HSPGs as appropriate to maintain currency.	O	2	
<b>Ranching Landscape, Wallace Pratt Properties, and Other Cultural Landscapes</b>				
128	Activity: Complete CLIs for Ship on the Desert (SOD) and Pratt Cabin.	S	1	Y
129	Activity: Complete CLIs for Williams Ranch, Hunter Line Cabin, and Bowl Cabin.	M	1	
130	Activity: Complete CLIs for Dog C. mining, Pine S. store, immigrant trail/Butterfield Stage route landscapes.	L	3	
131	Activity: Complete CLRs for SOD and Pratt Cabin.	M	1	
132	Activity: Complete CLR for the Pinery.	M	2	Y
133	Activity: Complete CLRs for Williams Ranch and Hunter Line Cabin.	M	2	
134	Activity: Prepare cultural landscape management plan for the following cultural landscapes: Williams Ranch, Hunter Line Cabin, SOD, and Pratt Cabin.	S	2	Y
135	Activity: Complete Historic Structure Report (HSR) for Frijole Ranch, Williams Ranch, Hunter Line Cabin, SOD, and Pratt Cabin.	M	2	
136	Activity: Develop Historic Structure Preservation Guide (HSPG) for Williams Ranch, Frijole Ranch, Hunter Line Cabin, SOD, Pratt Cabin, and the Pinery.	S	1	Y
137	Activity: Complete National Register nominations for Wallace Pratt properties.	S	1	Y
138	Activity: Complete Determinations of Eligibility (DOE) and National Register nominations for all properties listed as eligible on the LCS and CLI.	M	2	
139	Activity: Complete research on Cox Cabin and Bowl Cabin in consultation with SHPO for future management actions (planned as discovery sites and for eventual removal).	L	2	
140	Activity: Maintain and update the LCS.	O	2	

141	Activity: Maintain the CLAIMS data base.	O	2	
142	Activity: Complete inventory and research on ranching artifacts and features in consultation w/SHPO for future management actions (discovery sites). Incorporate data into GIS and appropriate park and WASO databases. [Interior fencing, historic windmills and water distribution/storage (tanks and stone dams) systems, historic spring use, and other artifacts.]	S	2	
143	Activity: Perform annual FMSS condition assessments for all Frijole Ranch structures, Williams Ranch house, Cox Cabin, Bowl Cabin, Hunter Line Cabin, SOD, Pratt Cabin, and the Pinery to determine maintenance needs and deferred maintenance (FCI); coordinate with LCS and CLI processes.	O	1	
144	Activity: Perform maintenance on Williams Ranch house, Hunter Line Cabin, Frijole Ranch buildings, SOD, Pratt Cabin, and the Pinery for preservation and to correct FCI deficiencies.	O	1	
145	Activity: Maintain cultural landscapes at Frijole, Hunter, Williams Ranch, SOD, Wallace Pratt Cabin, and the Pinery.	O	1	
146	GMP Action: Dredge Manzanita Spring periodically to maintain as a period-appropriate cultural landscape element.	S/O	3	Y
149	Activity: Document history through oral histories of individuals groups and others who have ties to the park.	O	2	
150	Activity: Develop vegetation management actions in consultation with SHPO for fire protection around cultural resources.	S	1	
151	Activity: Develop a Frijole Ranch DCP that identifies parking, picnic, and restroom locations and determine how best to preserve the historic cultural landscape.	S	1	
152	Activity: Develop an interpretive exhibit plan for the Frijole Ranch House based on the selected alternative from the GMP and the Comprehensive Interpretive Plan.	M	3	
153	Activity: Delineate Butterfield Stage Route for visitor interpretation and resource preservation. Promote nomination as part of the National Historic Trails system.	M	2	Y
156	Activity: Complete Historic Resource Study (HRS).	S	1	
158	Activity: Complete topic based research as needed to gather cultural information to meet management decision making needs (oil exploration, mining, Spanish exploration, military encampments, scientific legacy research and geology, etc.).	M	2	
<b>Ethnographic Resources</b>				
154	Activity: Conduct ethnographic research to identify ethnographic resources and landscapes (including traditional cultural properties) and perform National Register nominations as appropriate.	M	2	
155	Activity: Identify Traditional Cultural Properties (TCP) and conduct consultation as appropriate.	M	2	Y
159a	Activity: Maintain current contact information for culturally affiliated tribes for consultation purposes and develop a formal tribal consultation plan for the park.	O	1	
159b	Activity: Complete park NAGPRA related responsibilities including tribal consultation, notices of intent, repatriation, and reinterment.	S	1	Y



<b>Museum Collections and Archives</b>				
160	Activity: Enter backlog catalog into ANCS+. [See PMIS 72634, 72618, 72846, 72187]	S/M	2	
161	Activity: Curate incoming specimens and catalog in ANCS+ to prevent generating a cataloging backlog and potential loss of specimen data.	L/O	2	
162	GMP Action: Pursue development of secure curatorial storage facility for objects, artifacts, and specimens to meet current and expanding needs.	M	1	Y
163	Activity: Develop a photographic documentation program for all objects, artifacts, and specimens.	O	2	
165	Activity: Perform annual random sample and controlled property inventories.	O	1	
166a	Activity: Update the museum collections management plan.	M	2	
166b	Activity: Develop and implement an emergency preparedness plan for museum objects in collection storage and on display.	S	1	Y
167	Activity: Update the scope of collections statement.	S	1	
168	Activity: Prepare an archive assessment and archival management plan; request assistance from Regional Archivist.	M	2	Y



Table 11b. Comprehensive strategies for cultural resources

See end of table for color key

		Year																			
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
<b>Historic Resource Study</b>	156 - Historic Resource Study										158 - Research on topics not covered in HRS (scientific legacy, geology, etc.)										
	149 - Conduct oral histories as needed																				
<b>Historic Structures</b>	150 - Develop veg. mgmt. actions for fire protection; consult w/ SHPO					135 - Complete HSRs for Frijole Ranch, Williams Ranch, Hunter Line Cabin, SOD, and Pratt Cabin															
					153 - Delineate Butterfield Stage Route																
					152 - Interpretive exhibit plan for Frijole Ranch House																
	143 - Conduct annual FMSS condition assessments																				
<b>Cultural Landscape Inventories (CLIs)</b>	128 - CLI for Ship-On-the-Desert					129 - CLIs for Williams Ranch, Hunter Line Cabin, and Bowl Cabin							114 - CLI for McKittrick Canyon arch. district			130 - CLIs for Dog Canyon mining, Pine Springs store, Butterfield Stage Route/Emigrant trail					
<b>Cultural Landscape Reports (CLRs)</b>				131 - CLRs for SOD and Pratt Cabin		132 - CLR for Pinery															
							133 - CLRs for Williams Ranch and Hunter Line Cabin														
<b>Cultural Landscapes</b>	146 - Dredge Manzanita Spring														146 - Dredge Manzanita Spring						146 - Dredge Manzanita Spring
	151 - Frijole Ranch DCP																				
		134 - Cultural landscape mgmt. plans for Williams Ranch, Hunter Line Cabin, SOD, and Pratt Cabin																			
						158 - Complete topic based research to support management needs															

Table 11b. Comprehensive strategies for cultural resources (continued)

		Year																			
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
<b>Cultural Landscapes</b>		145 - Maintain cultural landscapes																			
		144 - Perform maintenance to correct FCI deficiencies																			
<b>SHPO Consultation</b>	136 - Develop Historic Structures Preservation Guide																				
<b>SHPO Consultation</b>													139 - Research on Cox Cabin and Bowl Cabin; consult w/ SHPO								
<b>National Register Nominations</b>	137 - NR nomination for Pratt properties								138 - NR nominations for other properties listed as eligible in LCS & CLI												
<b>Ethno Resources</b>					154, 155 - Ethnographic research and identify TCPs; update ethno O&A																
<b>Archeologic Resources</b>		159a - Update Tribal contact information after every Tribal election																			
	159b - Complete NAGPRA consultations																				
					110 - Re-evaluate arch. sites with missing and incomplete data																
							115 - Rock art mgmt. plan														
			111 - Periodic condition assessment of arch. sites																		
			109a, 109b - Complete Section 110 inventory to meet 100% survey level; update arch. O&A; complete and submit NR nominations as appropriate																		
<b>Museum Collections</b>	167 - Update Scope of Collections Statement																				



Table 11b. Comprehensive strategies for cultural resources (continued)

Year

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	
<b>Museum Collections</b>		166b - Complete museum collection emergency preparedness plan																			
			142 - Inventory and research on ranching artifacts																		
				166a - Update museum collections mgmt. plan																	
					168 - Archive assessment and mgmt. plan																
						162 - Planning and construction of new curatorial facility/admin. HQ															
	163 - Develop and maintain photographic documentation program																				
	161 - Curate incoming specimens and catalog in ANCS+																				
	165 - Annual random sample & controlled property inventories																				
<b>Data Management</b>		160 - Enter backlog catalog into ANCS+				160 - Enter backlog catalog into ANCS+															
				117 - Review and update CLIs, CLRs, HSRs, and HSPGs					117 - Review and update CLIs, CLRs, HSRs, and HSPGs					117 - Review and update CLIs, CLRs, HSRs, and HSPGs					117 - Review and update CLIs, CLRs, HSRs, and HSPGs		
		112 - Maintain ASMIS database																			

**Table 11b. Comprehensive strategies for cultural resources (continued)**

		Year																			
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
<b>Data Management</b>		140, 141 - Maintain/update LCS and CLAIMS database																			
<b>Potential Funding Sources</b>	Centennial Challenge	ONPS - Park Base	Servicewide Comprehensive Call (SCC)	Chihuahuan Desert Network (CHDN) I&M	Line Item Construction	Fire Program	Partnership (NPS)	Partnership (Non-NPS)													

Table 12a. Descriptions of comprehensive strategies for program management

ACTIVITY NUMBER	COMPREHENSIVE STRATEGY	TIMING	PRIORITY	PARTNER-SHIP
<b>OTHER PARK-WIDE NEEDS/ACTIVITIES FOR RESOURCE MANAGEMENT PROGRAM</b>				
169	Activity: Develop protocols for data collection and database management, including archives. [See PMIS statement 72403]	S	1	
170, 171	Activity: Maintain and manage park GIS database. Download and correct GPS data from field projects. Create metadata and establish directory structures for data retrieval. Integrate new data into databases for research and resource management purposes.	O	1	
172	Activity: Archive completed project data. Retain accessibility records.	O	2	
173	Activity: Mine and assess legacy data sets for relevant information and integrate them into assessments of resource condition and management needs. Convert legacy data and images into digital format.	S/M	2	Y
174	Activity: Utilize the interpretive/education program to highlight resources and educate people about the park's resources and build long-term support for resource management and stewardship.	O	2	
175	Activity: Develop a prioritized list of park research needs and use it to communicate with potential researchers and partners and to leverage outside interests and funding for park resource management.	S/O	1	
177	Activity: Coordinate protocol development for RSS indicators with CHDN I&M Network.	M	1	
178	Activity: Coordinate data management needs and database development with CHDN I&M Network.	O	1	
179	Activity: Develop a strategic approach for developing PMIS statements, work orders, and technical assistance requests that relate to the list of comprehensive strategies.	O	1	
180	GMP Mitigation Measure: Implement a spill prevention and pollution control program for hazardous materials.	S/O	2	
181	Activity: Manage the Research Permit and Reporting System (RPRS), Investigators' Annual Reports, final reports and files for ~20 projects annually. Provide researcher support and orientation. Make resulting materials available to staff.	O	1	
182	Activity: Develop partnerships with adjacent land management agencies for ecosystem scale natural and cultural resource projects.	O	3	
191	Activity: Mountain lion-visitor safety management plan.	S	1	
192	Activity: DCP for west side addition.	M	1	





**Table 12b. Comprehensive strategies for program management**

See end of table for color key

Year

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
	175 - Develop & communicate priority research needs			175 - Update research needs		175 - Update research needs		175 - Update research needs		175 - Update research needs		175 - Update research needs		175 - Update research needs		175 - Update research needs		175 - Update research needs		175 - Update research needs
	180 - Develop & implement spill prevention plan					180 - Update spill prevention plan					180 - Update spill prevention plan					180 - Update spill prevention plan				
		191 - Mountain lion-visitor safety mgmt. plan																		
			192 - DCP for west side (addition)																	
	181 - Manage research program and inform staff																			
	174 - Utilize interpretation/education program to build support for resource stewardship																			
	182 - Coordinate with adjacent federal land managers (USFS, BLM) on large scale resource projects																			
	179 - Develop approach to plan, fund, and implement RSS strategies																			
<b>Protocol Development</b>					177 - Protocol development for RSS indicators; coordination w/ CHDN															
<b>Data Management</b>	169 - Protocols for data collection and mgmt.																			
	173 - Mine and assess legacy data																			
	170, 171 - GPS/GIS data mgmt.																			
	178 - Coordinate data needs and database management w/ CHDN																			
	172 - Archive completed project data and retain accessibility records.																			

**Potential Funding Sources**

Centennial Challenge	ONPS - Park Base	Servicewide Comprehensive Call (SCC)	Chihuahuan Desert Network (CHDN) I&M	Line Item Construction	Fire Program	Partnership (NPS)	Partnership (Non-NPS)
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## **EXPERT REVIEW OF COMPREHENSIVE STRATEGIES**

Expert review, conducted by individuals outside of the park or agency who have expert knowledge of a particular discipline, ensures that comprehensive strategies developed by the park are the best management strategies, based on current science and scholarship. The rationale for expert review suggests that an individual author or team may not catch every flaw in a complicated comprehensive strategy. Expert review increases the probability that weaknesses will be identified and corrected.

Although the resource stewardship strategy does not outline implementation procedures, it does outline the methodical process necessary to improve or maintain current conditions. Expert reviewers are asked to look at methods for determining current conditions, methods for measuring changes in those conditions, and the logical sequence of events that are needed to attain desired conditions. They ascertain whether the comprehensive strategies are credible, feasible, and practicable given the current state of art and science in resource management. A list of the expert reviewers of this resource stewardship strategy is included in Appendix A.

## **FUNDING THE COMPREHENSIVE STRATEGIES**

The resource stewardship strategy is designed to help park management identify, prioritize, and fund resource management projects. Similar to a park asset management plan (PAMP), the resource stewardship strategy documents needs and allows the park to develop Project Management Information System (PMIS) statements and Operations Formulation System (OFS) requests that correspond to park priorities, ultimately improving the park's performance.

The resource stewardship strategy provides accountability of funds used for attaining and maintaining desired conditions as well as projections of needed project and base funding. Although comprehensive strategies can be plotted for a 20-year time period, financial planning is difficult to do over a similar time span. Project planning is generally done for five-years into the future.

## **RESOURCE MANAGEMENT AND THE PARK BUDGET**

This section provides information on the park budget and how it has been used to support park management, including resource stewardship. The FY 2008 park budget is displayed according to primary fund categories (Figure 14). Actual expenditures for the previous five years (FY2003-2007) plus budgeted figures for FY08 are identified in Figure 15. Figures 16 and 17 show expenditures and budgets for natural and cultural resource management for the same period. Current and historical budget information is taken directly from an NPS administrative software package called AFS-3. The current park organizational chart is included in Figure 18.

Figure 14. Allocation of park budget, FY2008

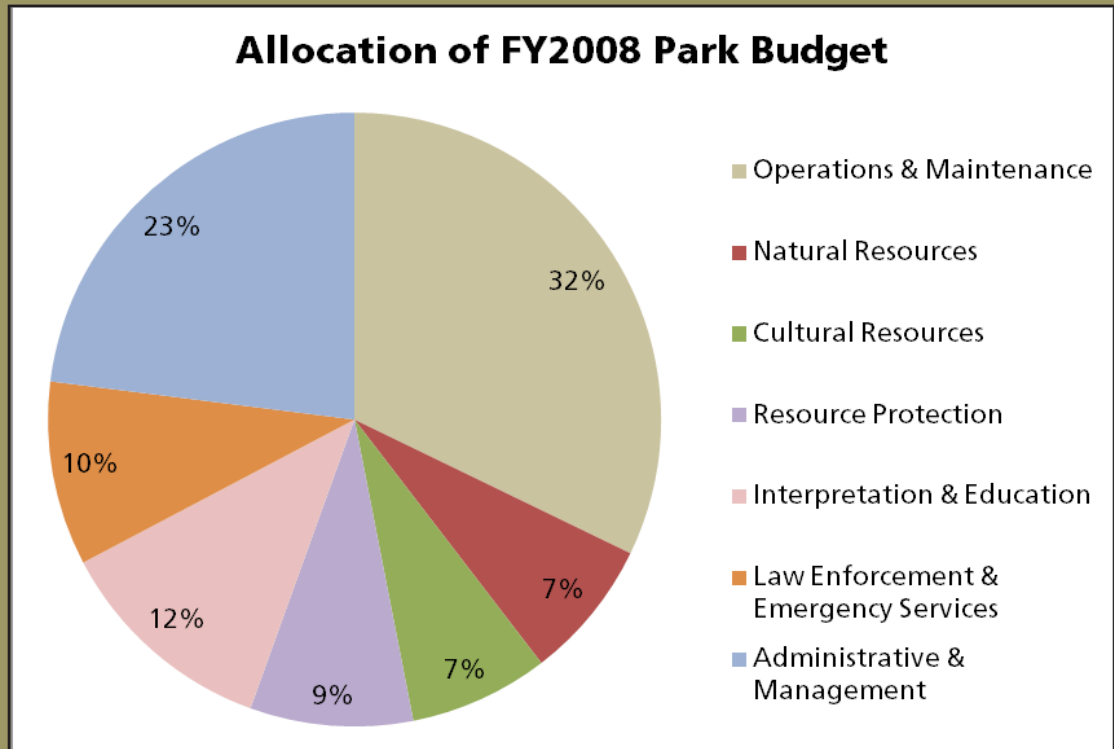


Figure 15. Total park expenditures, FY2003-2008

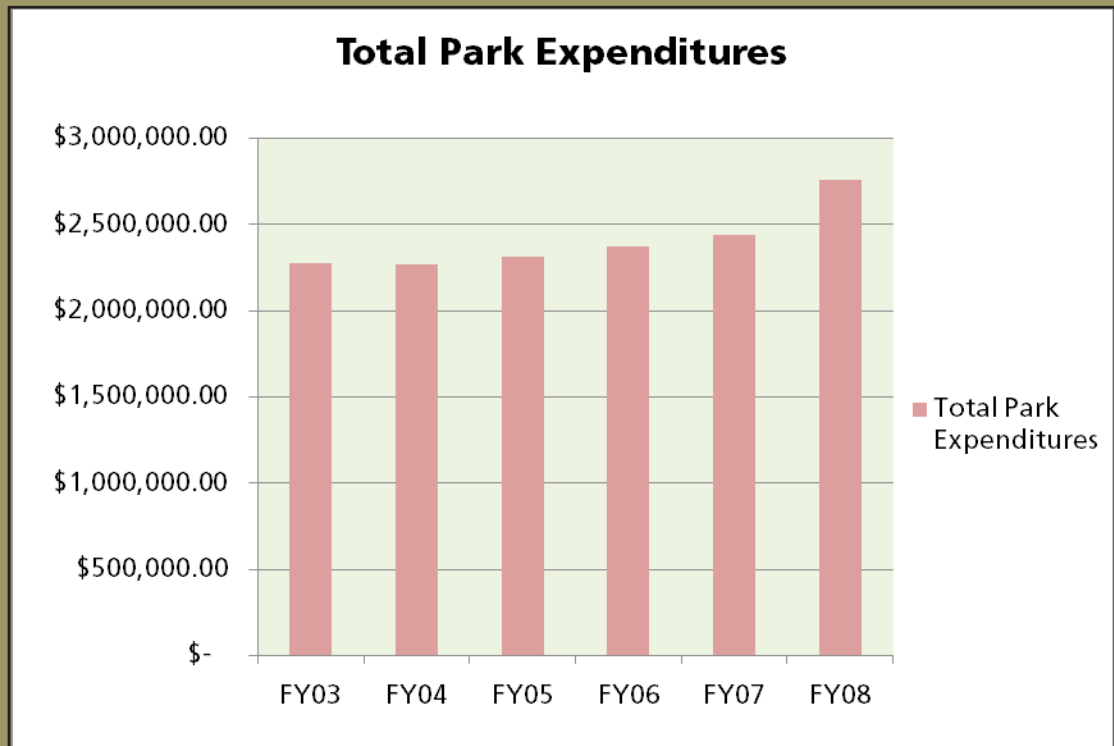




Figure 16. Natural resource expenditures, FY2003-2008

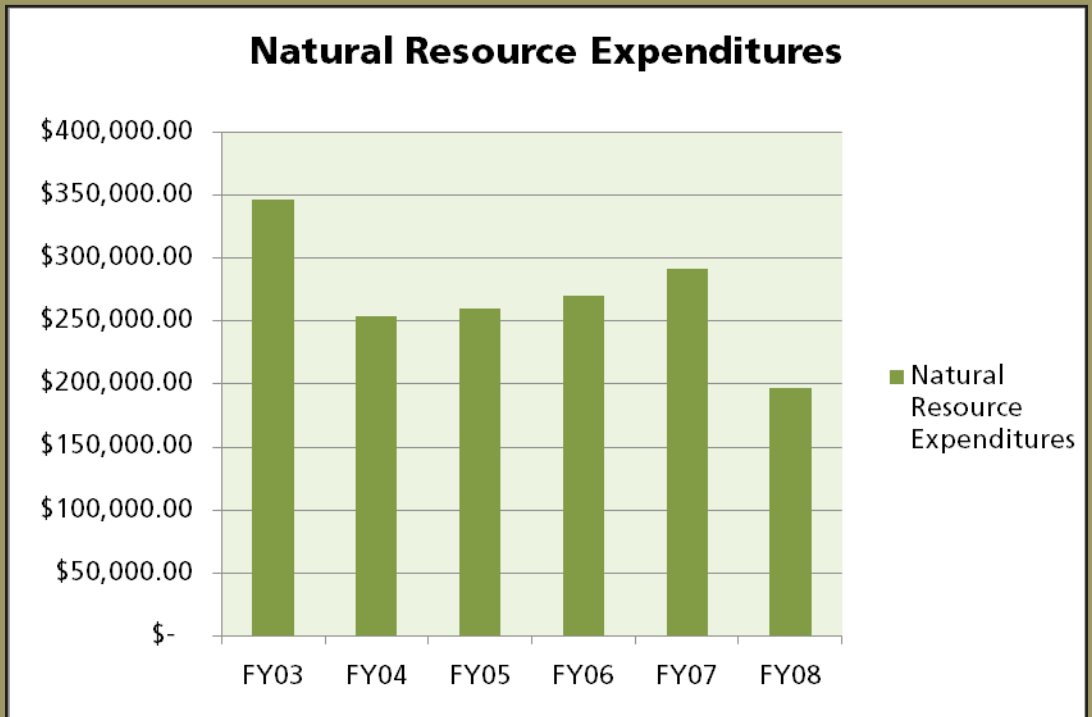
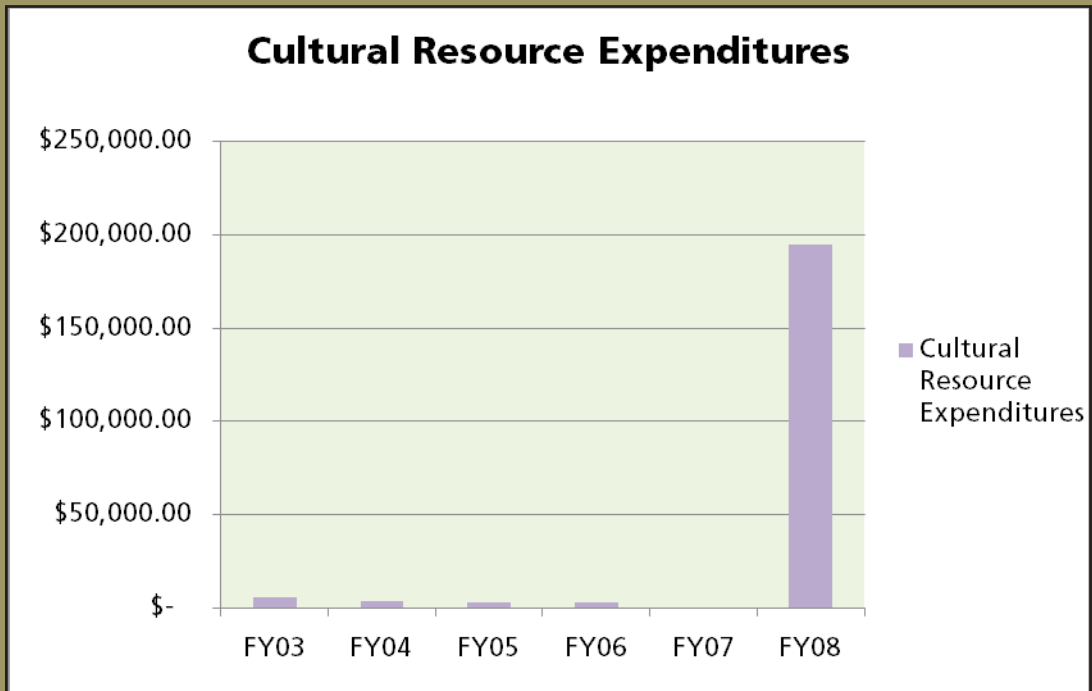


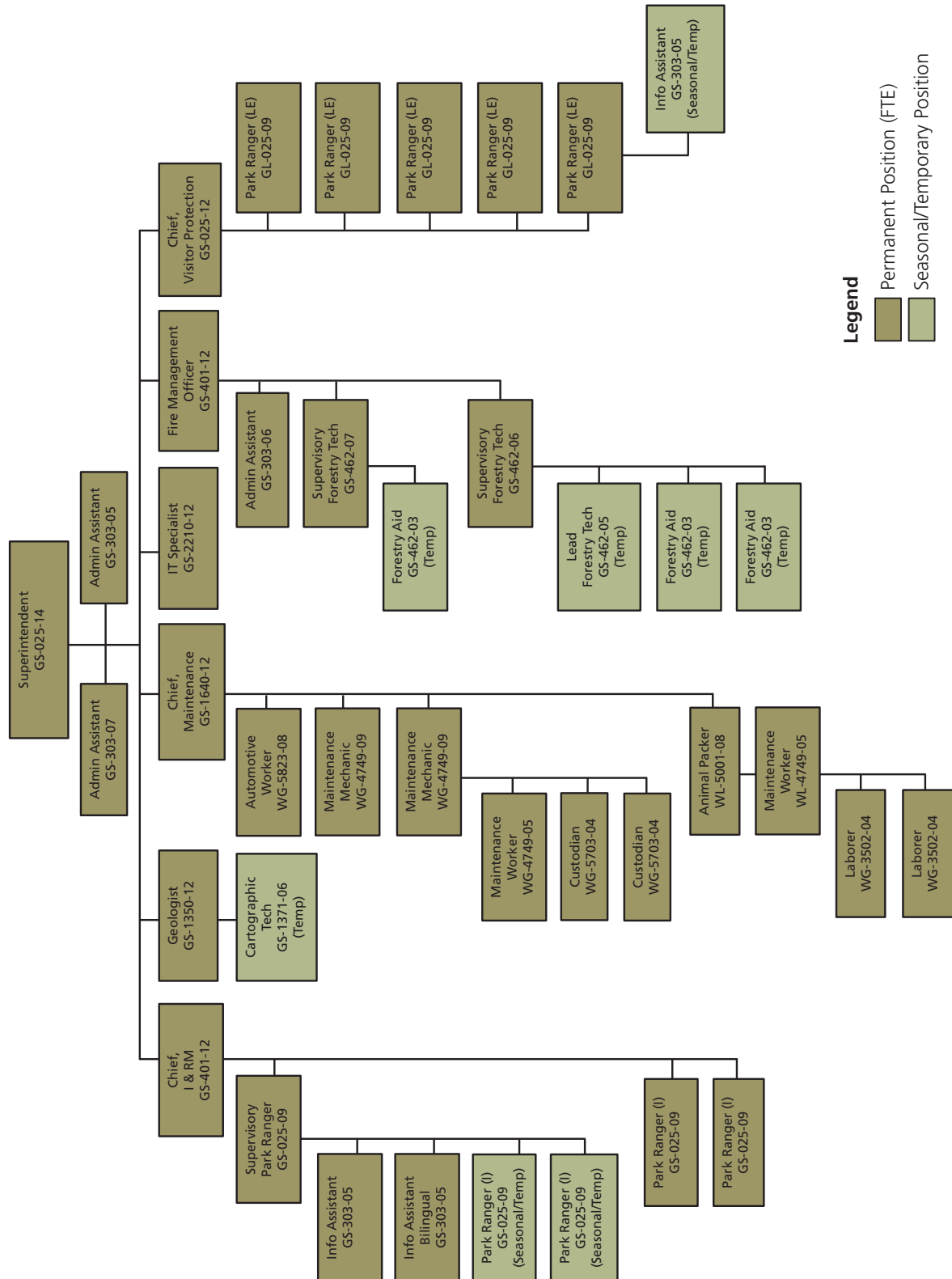
Figure 17. Cultural resource expenditures, FY2003-2008



Costs displayed in Figure 17 reflect the following issues:

- Salary costs for staff with cultural resource responsibilities were not included in FY 2003-2007. FY 2008 was the first year that personnel costs were attributed to cultural resource management.
- Costs for maintaining cultural resources (historic buildings and structures) are not included – they are accounted for under operations and maintenance and are reflected in total park expenditures (Figure 15).

The organizational chart depicted in Figure 18 reflects the park’s approved position alignment (based on core operations analysis) for FY 2008.



**Legend**  
 Permanent Position (FTE)  
 Seasonal/Temporary Position

Figure 18. Current park organizational chart

## PROJECTED FUNDING NEEDS TO IMPLEMENT THE RESOURCE STEWARDSHIP STRATEGY

The method of cost projection for the resource stewardship strategy differs significantly from methods associated with park business plans, the *Living Within Our Means 85% Plan*, or the *Core Operations Plan*. These plans are tools used to examine fiscal resources and set management priorities within the mission of the park. They take into account limited fiscal resources, while the resource stewardship strategy attempts to project what the fiscal needs would be to attain desired conditions within a reasonable time-frame and to maintain those conditions once they are achieved. These business-related plans also differ from the resource stewardship strategy in that they are not a simple extension of the general management plan. The resource stewardship strategy may serve to inform these types of fiscally constrained planning tools.

This section provides information on projected future costs of resource stewardship. The costs of personnel, supplies, and equipment needed to implement the comprehensive strategies are included in the estimates and carried forward into the budget projections for all out years. Budget projections are made for 10 years from today (through 2018). The projected total cost of resource stewardship is displayed in Figure 19, along with historical budget information for comparison purposes. These figures reflect the implementation of an integrated resource management program – they include costs for natural and cultural resources, and to a lesser extent costs for support needed from administrative, management, resource protection, and law enforcement. These figures are reflective of the cost to implement the comprehensive strategies – they do not take into account current resource management activities and costs. Consequently, a budget that would fully meet desired conditions for resources would have to add these costs to current levels of funding.

The projected cost of natural and cultural resource management are presented individually in Figures 20 and 21, respectively. A more detailed explanation of how cost estimates and budget projections were calculated is included in Appendix H.

Figure 22 displays a representative allocation of the park budget (using projected costs for FY 2014) if resource stewardship needs were fully funded.

The park organizational chart needed to attain desired resource conditions is shown in Figure 23.

Figure 19. Historical and projected costs of resource stewardship program, FY2005-2018

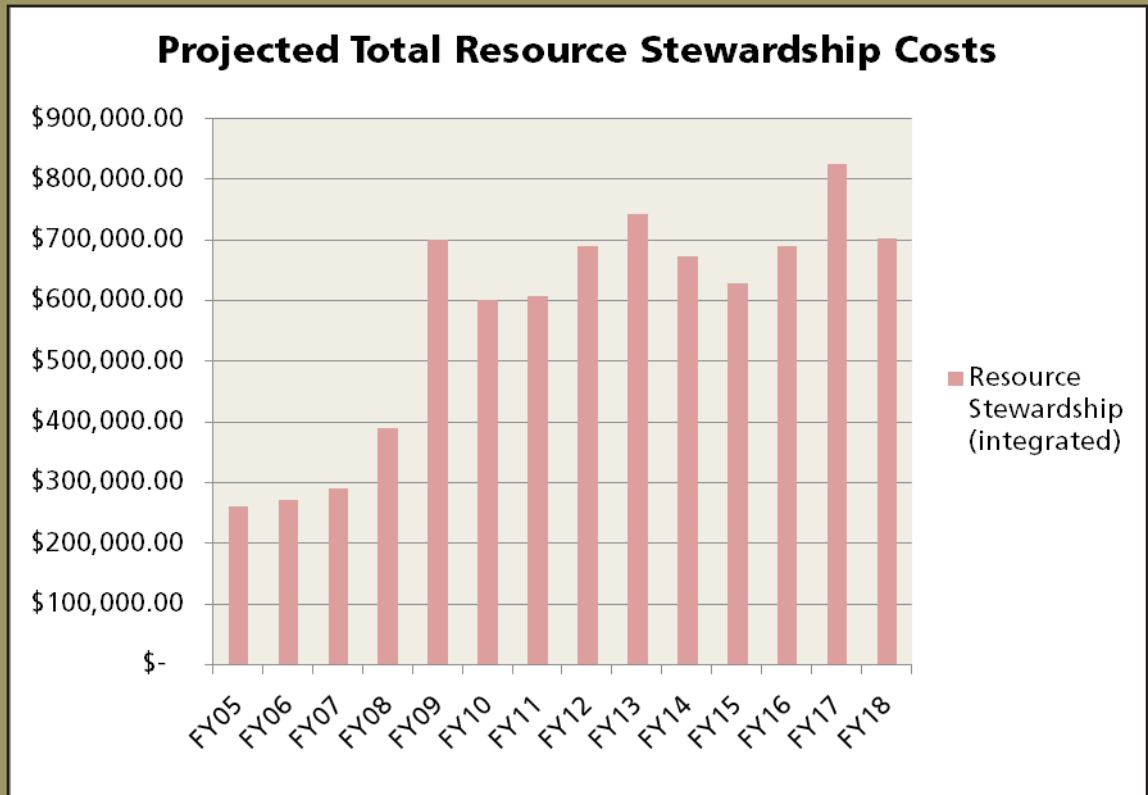


Figure 20. Historical and projected costs of natural resource activities, FY2005-2018

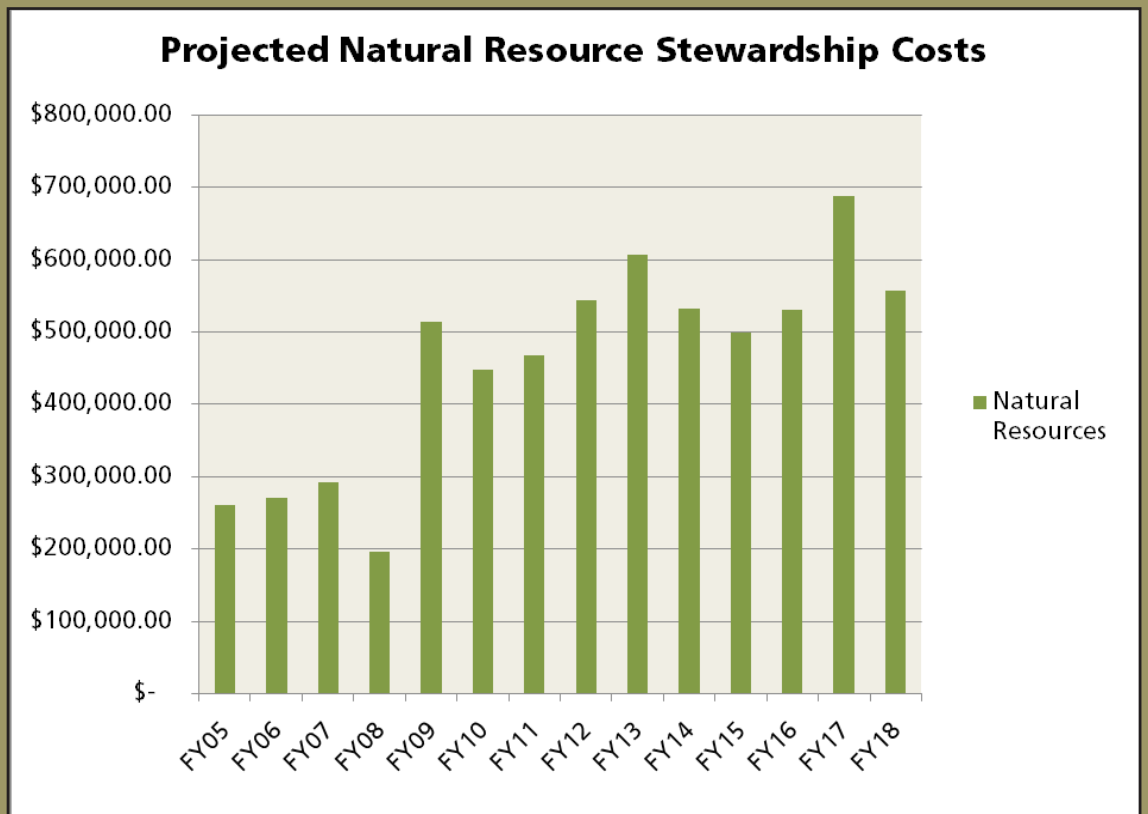
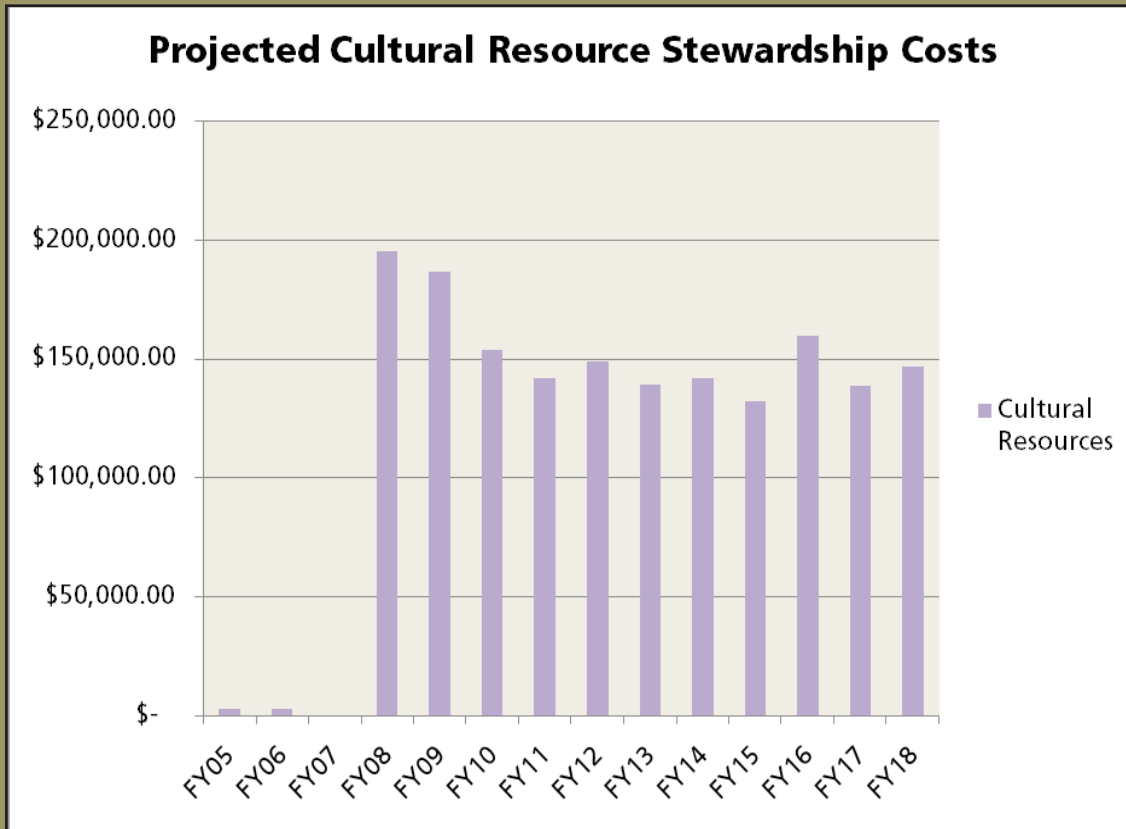


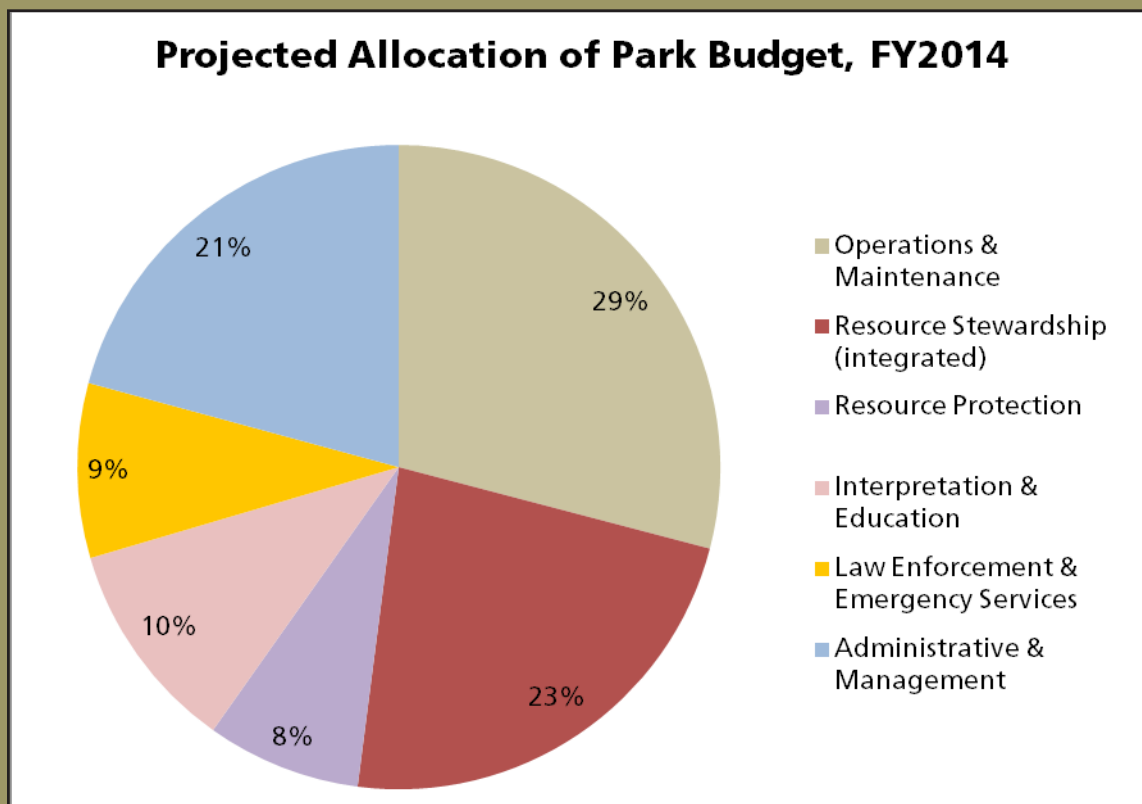


Figure 21. Historical and projected costs of cultural resource activities, FY2005-2018



As noted for Figure 17, Figure 21 includes information for FY 2005-2007 that does not include costs for personnel salary or maintenance of historic structures. Personnel and equipment costs are accounted for in the figures for FY2008-2018; however, maintenance of historic buildings and structures is addressed with operations and maintenance funding and is not reflected in these figures.

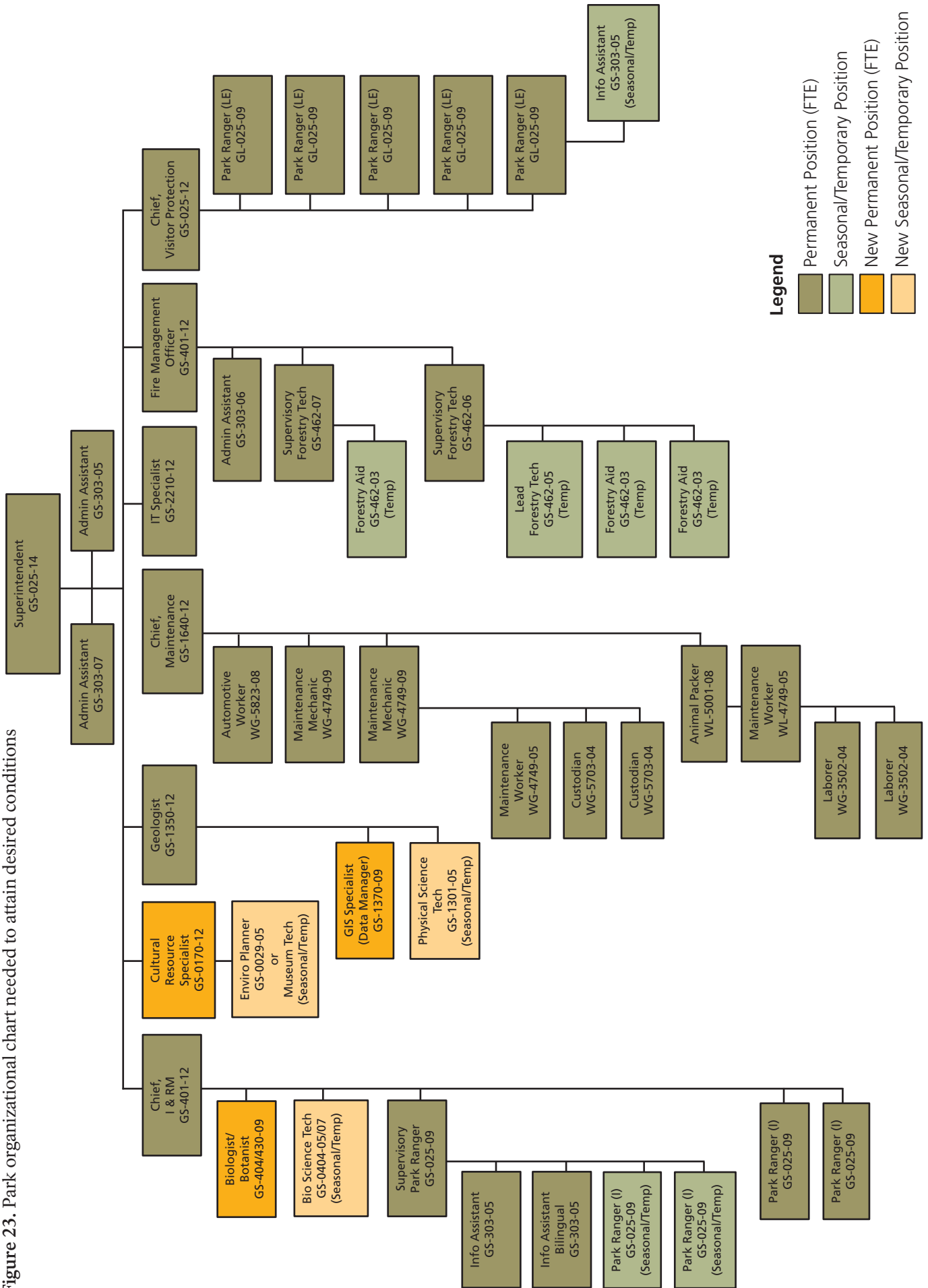
Figure 22. Representative future allocation of park budget, FY 2014



In this figure, 23% of the park’s budget is allocated to resource stewardship, compared to 14% in FY08 (Figure 14). The purpose of this figure is to show how much of the park budget would have to be dedicated to resource management to maintain or achieve desired resource conditions. It is included for illustration and comparison purposes only. Percentages shown in this figure presume that all other program areas and fund categories (other than resource stewardship) remain at FY08 funding levels.

The organizational chart depicted in Figure 23 reflects the organizational structure and positions identified as necessary to implement the actions and goals that are needed to achieve or maintain desired resource conditions. Six additional positions have been identified: three permanent positions (a cultural resource specialist, a biologist/botanist, and a GIS specialist/data manager) and three temporary or seasonal positions (an environmental planner or museum technician, a biological science technician, and a physical science technician). The new temporary/seasonal positions, along with several other existing temporary/seasonal positions, would provide flexibility because these positions could be shifted at the park’s discretion to meet fluctuating staffing needs and priorities.

Figure 23. Park organizational chart needed to attain desired conditions



## **FINALIZATION**

The resource stewardship strategy is reviewed by experts for scientific/scholarly credibility and reviewed by the park superintendent for approval before implementation. The resource stewardship strategy can be implemented upon final signature approval of the document. The document will be used as the guide for following a logical sequence of activities to attain and maintain desired resource conditions. The environmental planning process will be initiated in developing all implementation plans and decisions that have potential for impacting the resource or environment.

## **IMPLEMENTATION – TRACKING AND EVALUATING ANNUAL PROGRESS**

This resource stewardship strategy shall be reviewed annually to track and document progress. Additional information on resources, activities, and resource conditions shall be entered into annual addenda to this resource stewardship strategy. Comprehensive strategies within this document may have minor changes made to them to accommodate unpredictable situations, but if a need for major change to the logical sequence and flow of activities occurs, the park would consider amending or re-writing the resource stewardship strategy.

The budget section of this resource stewardship strategy shall be reviewed and updated annually with actual program costs and estimates of future program needs. All of these materials shall be filed in an annual addendum.

Materials to include in addenda

- Accomplishments from activities in comprehensive strategies and related project and compliance documentation citations
- Activities within the comprehensive strategies that were not accomplished and alternate plans to achieve objectives
- Additional scholarly or scientific work or data that affect comprehensive strategies
- General evaluation of progress toward attaining/maintaining desired conditions
- Revised budget section

Furthermore, if Microsoft Project is used to manage projects that are a part, or an outcome, of this resource stewardship strategy, then individual project files (including staffing resources, schedules, and budgets) will also have to be managed on a routine basis.



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## UNIQUE ELEMENTS OF THIS PILOT RESOURCE STEWARDSHIP STRATEGY

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The Resource Stewardship Strategy (RSS) program was initiated with a national pilot project that was conducted in 2006 at Herbert Hoover National Historic Site (HEHO). In FY2008 additional pilot projects were initiated at parks in each of the seven NPS regions: Denali National Park (DENA), Point Reyes National Seashore (PORE), Guadalupe Mountains National Park (GUMO), Effigy Mounds National Monument (EFMO), New River Gorge National River (NERI), Monocacy National Battlefield (MONO), and Chattahoochee River National Recreation Area (CHAT).

At the time of this writing, only HEHO and DENA had completed and published their resource stewardship strategy. Therefore, experimentation and learning has been limited. Several elements of the GUMO resource stewardship strategy are worth highlighting for the benefit of the other pilot projects, as well as those that are initiated later in time. It is the park's hope that the GUMO example will add to the body of knowledge of the resource stewardship strategy program and be used by other parks where relevant and appropriate.

The following elements are unique to the GUMO resource stewardship strategy and are worth future discussion and consideration:

- **Identify fundamental (and other important) resources and values** – the park's GMP did not contain information on fundamental (and other important) resources and values; therefore, the park identified these at a one-day workshop at the beginning of the RSS process. Park staff then completed any follow-up work that was necessary to describe these resources. A full foundation statement was not completed.
- **Include non-traditional partners and outside agency personnel in your planning process** – the park invited a variety of non-traditional partners (staff from local non-profit organizations, a university, and the local county economic development corporation) and outside agency personnel (staff from adjacent USFS and BLM properties) to serve as subject matter experts. These individuals contributed a wealth of expertise and perspective to the process. Other non-traditional partners/interested individuals served as expert reviewers of the document.
- **Develop indicators and target values that are as precise and quantifiable as possible** – the RSS planning team held high standards for selecting indicators and establishing target values. The more precise and quantifiable they are, the less interpretation that is required to track and report on resource condition. Future managers will also be left with a systematic evaluation program.
- **Integration of NRPC staff and products** – several staff members from the Natural Resource Program Center (NRPC) participated as subject matter experts throughout the planning process and produced key information and reports that supported the selection of indicators and target values. The timing and integration of their involvement and products is an important consideration.
- **Establishing the timing and priority of all comprehensive strategies** – all activities that make up the comprehensive strategies were evaluated for their timing and priority. This exercise allowed the team to more easily develop the timelines that are part of this resource stewardship strategy and effectively evaluate them against park goals and objectives. They also support the development and refinement of annual work plans for the park's organizational divisions.

- **Develop a project management system that supports the RSS comprehensive strategies** – all comprehensive strategies (including the activities, their timing, and preliminary cost estimates) will be loaded into Microsoft Project to begin the process of developing a project management system that the park could use to track and manage resource projects. As park staff become familiar with MS Project, they can use it to manage aspects of the resource management program, ultimately improving their performance and the success of the program and the park.

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- 2008b *Physical Resources Stewardship Report, Guadalupe Mountains National Park*. Prepared by Natural Resource Program Center: D. Weeks, D. Vana-Miller, D. Greco and E. Porter. Natural Resource Technical Report NPS/NRPC/NRTR—2008/121

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Far West Texas Water Planning Group

- 2006 *Far West Texas Water Plan (January 2006)* prepared for the Texas Water Development Board.

# APPENDIX A: INTERDISCIPLINARY TEAM AND EXPERT REVIEWERS

## **Interdisciplinary Team**

### *Core Team:*

Fred Armstrong, Chief of Biological Resources and Visitor Services, GUMO  
Gorden Bell, Physical Science Program Manager, GUMO  
Darren Bryant, Chief of Facility Management, GUMO  
John V. Lujan, Superintendent, GUMO  
Jan Wobbenhorst, [Retired] Chief of Visitor and Resource Protection, GUMO  
Jonena Hearst, Data Management Technician, GUMO  
Tricia Gibson, Cultural Resources Program Manager, GUMO  
Patrick Malone, RSS Planner and Writer-Editor, Denver Service Center, NPS  
Phil Thys, Visual Information Specialist, Denver Service Center, NPS

### *Extended Team:*

Bruce Bingham, Regional RSS Coordinator for Inventory & Monitoring Program, Intermountain Region, NPS  
Michele Curran (former)/Vicky Jacobson (current), Regional RSS Coordinator for Cultural Resources, Intermountain Region, NPS  
Richard Gatewood, Area Ecologist, Chihuahuan Desert Inventory & Monitoring Network, NPS  
Gary Mason, National RSS Program Manager, Natural Resource Stewardship and Science Directorate (Washington, D.C.), NPS  
John Montoya, Fire Management Officer, GUMO/CAVE  
Hildy Reiser, Network Coordinator, Chihuahuan Desert Inventory & Monitoring Network, NPS  
Bonnie Semro, Regional RSS Coordinator for Natural Resources, Intermountain Region, NPS  
Jeff Pinkard, GIS Technician, Intermountain Region, NPS

### *Subject Matter Experts:*

Don Weeks, Hydrologist, NRPC Water Resources Division, NPS  
David Vana-Miller, Hydrologist, NRPC Water Resources Division, NPS  
Deanna Greco, Geomorphologist, NRPC Geologic Resources Division, NPS  
Bruce Polkowsky, Environmental Protection Specialist, NRPC Air Resources Division, NPS  
Ellen Porter, Environmental Protection Specialist, NRPC Air Resources Division, NPS

### **Expert Reviewers:**

Richard Worthington, Professor, University of Texas at El Paso – technical review focused on biological sciences  
Alton Brown, independent consulting geologist – technical review focused on geologic resources  
John Baker, independent wilderness advocate/citizen - technical review focused on wilderness/social issues  
John Karges, Conservation Biologist, The Nature Conservancy - technical review focused on natural resources, external threats, and partnerships  
Paul Katz, PhD., historian – technical review focused on cultural resources

## APPENDIX B: LIST OF WORKSHOP PARTICIPANTS

Name	Agency/Organization	Discipline	E-mail	Workshop(s) Attended
Bob Pawelek	BLM- Carlsbad Field Office	Archeologist	robert_pawelek@nm.blm.gov	October 2007
Bruce Bingham	NPS- Intermountain Region	Inventory & Monitoring	bruce_bingham@nps.gov	October 2007
Cathy Hoyt	Chihuahuan Desert Research Inst.	Chihuahuan Desert Ecology	choyt@cdri.org	October 2007
Darren Bryant	NPS- GUMO	Facilities Maintenance	darren_bryant@nps.gov	July 2007, Oct. 2007, April 2008
Dave Bieri	NPS- GUMO	Visitor Services/CR	dave_bieri@nps.gov	October 2007, April 2008
Deanna Greco	NPS- Geologic Resources Division	Geology	deanna_greco@nps.gov	October 2007, April 2008
Don Weeks	NPS- Water Resources Division	Hydrology	don_weeks@nps.gov	October 2007, April 2008
Fred Armstrong	NPS- GUMO	Natural/Cultural Resources	fred_armstrong@nps.gov	July 2007, October 2007, April 2008, June 2008
Gary Mason	NPS- Washington Office	Planner	gary_mason@nps.gov	October 2007
Gorden Bell	NPS- GUMO	Geology/Paleontology	gorden_bell@nps.gov	July 2007, October 2007, April 2008, June 2008
Hildy Reiser	NPS- Chihuahuan Desert Network	Inventory & Monitoring	hildy_reiser@nps.gov	October 2007, April 2008
Jan Wobbenhorst	NPS- GUMO (Retired Jan. 2008)	Resource Protection	janwob@hunte.net	July 2007, Oct. 2007, April 2008
Jeff McCoy	Van Horn Econ. Developmt. Corp.	Tourism/Planning	vhedc@telstar1.com	October 2007
Jeff Shepherd	University of Texas- El Paso	History	jpshepherd@utep.edu	October 2007
John Cwiklik	NPS- GUMO	Resource Protection	john_cwiklik@nps.gov	October 2007, April 2008
John Lujan	NPS- GUMO	Park Management	john_lujan@nps.gov	July 2007, October 2007, April 2008, June 2008
Jonena Hearst	NPS- GUMO	Data Management/NR/CR	jonena_hearst@nps.gov	July 2007, Oct. 2007, April 2008
Larry Paul	USFS- Lincoln NF	Natural Resources	lpaul@fs.fed.us	October 2007
Lila Mohesky-Roybal	NPS- CAVE	Resource Protection	lila_mohesky-roybal@nps.gov	October 2007
Lila Walker	NPS- GUMO	Administration	lila_walker@nps.gov	October 2007
Michael Haynie	NPS- GUMO	Visitor Services/Biology	michael_haynie@nps.gov	October 2007, April 2008
Michele Curran	NPS- Intermountain Region	Cultural Resources	michele_curran@nps.gov	October 2007
Patrick Malone	NPS- Denver Service Center	Planner (Meeting Facilitator)	patrick_malone@nps.gov	July 2007, October 2007, April 2008, June 2008
Richard Gatewood	NPS- BIBE (CHDN)	Fire Ecology	richard_gatewood@nps.gov	October 2007, April 2008
Steve Daly	BLM- Carlsbad Field Office	Natural Resources	steve_daly@nm.blm.gov	October 2007
Steve West	New Mexico Wilderness Alliance	Wilderness, Biology	steve@nmwild.org	October 2007, April 2008
Vicky Jacobson	NPS- Intermountain Region	Cultural Resources	vicky_jacobson@nps.gov	April 2008
Wes Leonard	New Mexico Wilderness Alliance	Wilderness	cleonard@utep.edu	October 2007, April 2008



## **APPENDIX C: SUMMARY OF CIVIC ENGAGEMENT**

The public was notified that the park was initiating the RSS planning process through a news release issued to area media on May 11, 2007. The public was invited to stay informed through the park's website.

Other Federal, State and local agencies with responsibilities for resources in and adjacent to the park were notified about the RSS process, its role in the park's resource stewardship program, and opportunities to contribute to the process by a letter mailed to them on June 21, 2007.

Certain members of the public were identified as subject matter experts and were invited to participate in two planning workshops (held October 10-11, 2007 and April 29 – May 1, 2008). These people are identified in Appendix B and included individuals from other Federal agencies, universities, nongovernmental organizations, and local communities.

Another set of people, including members of the public, were invited to participate in the RSS process as expert reviewers. The individuals that reviewed and provided comments on the document, particularly the comprehensive strategies, are identified in Appendix A.

When the RSS is completed, a letter will be mailed to all affected agencies notifying them that the document has been completed and inviting them to view it on the park's website. A news release will also be sent to area media.

## APPENDIX D: VITAL SIGNS

CHDN Protocol	Vital Sign	Parameters Measured
<b>AIR QUALITY</b>		
	Ozone	ozone concentrations in air (following NPS ARD 2004)
	Atmospheric Wet/Dry Deposition	concentrations and depositions of pollutants, rainfall (following NPS ARD 2005; 2006)
	Particulate Matter	(none given for PM)
	Visibility	fine particles in air and light scattering and/or absorption
	Lichen/Mosses as Biomonitors	presence and spatial distribution of indicator lichen species, chemical testing for presence of pollutants
<b>CLIMATE</b>		
	General Meteorological Conditions	precipitation, wind speed/direction, relative humidity, temperature, solar radiation index, soil moisture
	Phenology (leaf out/drop, flowering)	time series photography of key plant species
<b>FOCAL SPECIES</b>		
	Bird Communities	abundance and diversity of bird species for winter and late-spring, summer in desert grasslands, riparian, and foothill woodlands
	Distribution and Abundance of Heteromyid Rodents	abundance and spatial distribution of heteromyid rodents in desert grassland and shrublands
<b>INVASIVE PLANTS</b>		
	Distribution and abundance of invasive/non-native plants	presence, distribution and rate of spread within the park and outside of park boundaries
<b>LANDSCAPE CONDITION AND DYNAMICS</b>		
	Land Use Changes Within Chihuahuan Desert	change detection in land cover types, river channels, impermeable surface index, road densities, oil and gas development wetness index
	Landscape Dynamics	(same as above)
	Landscape Fragmentation and Connectivity	(same as above)
<b>SOILS AND VEGETATION</b>		
	Bare Ground	amount and distribution of bare ground
	Biological Soil Crusts	
	Plant Community Composition	plant cover, density of woody and invasive plant species
	Soil Erosion (Wind and Water)	soil stability in desert grasslands and possibly foothill woodlands (following Herrick et al. 2005)
	Vegetation Patch Dynamics (Microscale)	qualitative change in composition and structure (via time series photos), vertical structure

CHDN Protocol	Vital Sign	Parameters Measured
<b>WATER QUALITY AND QUANTITY</b>		
	Groundwater Dynamics	(see water quality description)
	Invertebrates in Aquatic Systems	biotic integrity
	Persistence of Springs and Seeps	presence/absence of flow in springs
	Surface Water Dynamics	discharge (or frequency in ephemeral streams, stage, groundwater level)
	Water Quality (Surface and Groundwater)	ground (where applicable) and surface water temperature, pH, specific conductance, concentration of dissolved oxygen, bacteria loads, concentrations of common dissolved inorganic and common anthropogenic organic constituents, abundance of focal bacteria species, nutrients, water clarity

## APPENDIX E: LIST OF CULTURAL RESOURCE ASSETS AND CURRENT CONDITION ASSESSMENTS

Resource or Asset	Structure Number	LCS Condition	FMSS Condition (based on FCI)
Pinery Station	B-106	Fair (2007)	Poor
Guadalupe Ranch (Frijole) House	B-200	Good (2007)	Good
Guadalupe Ranch (Frijole) Barn and Corral	B-205	Good (2007)	Good
Williams Ranch House	B-281	Good (2007)	Good
Pratt Cabin/Lodge	B-342	Good (2007)	Good
Pratt Lodge Garage & Servant's Quarters	B-241	Good (2007)	Serious
Pratt Lodge Pumphouse	B-242	Good (2007)	Good
Ship on the Desert	B-341	Good (2007)	Good
Ship on the Desert Guest Quarters	B-343	Good (2007)	Good
Guadalupe Ranch Bunk House	B-207	Good (2007)	Fair
Guadalupe Ranch Toilet and Shower (Bath/ Restroom)	B-202	Good (2007)	Poor
Guadalupe Ranch (Frijole) Pump House	B-204	Good (2007)	Good
Guadalupe Ranch (Frijole) Spring House	B-203	Good (2007)	Good
Guadalupe Ranch Schoolhouse	B-201	Good (2007)	Good
Grisham-Hunter Line Cabin	B-243	Good (2007)	Good
Pratt Lodge Stone Fence	F-012	Good (2007)	Not entered
Guadalupe Ranch (Frijole) Water Tower	C-006	Fair (2007)	Not entered
Grisham-Hunter Tack Room (Outbuildings)	B-244	Poor (2007)	Good
Cabin in the Bowl	B-283	Fair (2007)	Good
Cabin at Cox Tank	B-286	Fair (2006)	Good
Grisham-Hunter Line Cabin Stone Walls	B-246	Fair (2007)	Not entered
Metal Water Tanks	W-023-36	Fair (2006)	Not entered
Upper Pine Springs Pumping Operation	W-007	Fair (2006)	Not entered
Ship on the Desert Stone Water Tanks	W-023	Good (2007)	Good
Ship on the Desert Tack Building (Barn) and Corral	B-142	Fair (2007)	Good
Stone Dam	D-001	Good (2007)	Not entered
Windmills with Metal Water Tanks	W-050-54	Fair (2006)	Not entered
Stone Dam	D-002	Good (2007)	Not entered
Stone Dam	D-003	Good (2007)	Not entered
Stone Dam	D-004	Fair (2007)	Not entered
Guadalupe Ranch (Frijole) Stone Fence	F-013	Good (2007)	Not entered
Butterfield Trail Segments	T-015	Fair (2007)	Not entered
Williams Ranch Corrals	C-003	Poor (2007)	Serious
Oil Well	W-201	Fair (2006)	Not entered

Cultural Landscape	CLI Condition
Frijole Ranch	Good (2006)
Williams Ranch	tbd
Bowl Cabin	tbd
Dog Canyon	tbd
Hunter Line Shack	tbd
Pinery Station	Fair (2006)
Pine Springs Store / Café	tbd
Emigrant Trail / Butterfield Stage Route	tbd
McKittrick Canyon Archeological District	tbd

## APPENDIX F: INDICES IDENTIFIED AND USED

Existing indices were employed to provide a measure of resource conditions, but it was recognized that some attributes may require more than one index of condition to fully describe desired and current conditions.

### Natural Resources

- “Actual Loss” score from the Paleontological Locality Condition Evaluation Form
- GSA Monitoring Assessment Form (specific criteria TBD)
- Dune Mobility Index
- Deciview Index
- Zenith Sky Brightness
- Total Sky Brightness
- Decibel (dB) Level Index for noise
- State water quality standards
- Index of Biological Integrity (IBI)
- Habitat Quality Index (HQI)

### Cultural Resources

- “Depositional Integrity” from the Archeological Site Condition Assessment Form
- “Site Disturbance Level” from the Archeological Site Condition Assessment Form
- “Threat or Disturbance Type” from the Archeological Site Condition Assessment Form
- Archeological Sites Management Information System (ASMIS) assessments
- List of Classified Structures (LCS) assessments
- Cultural Landscape Inventory (CLI) assessments
- Facility Condition Index (FCI) condition assessments from the Facility Management Software System (FMSS)
- ANCS+ standards
- “Completeness and Condition” criterion from random sample and controlled property inventories



## APPENDIX G: METHODOLOGY FOR MAP DEVELOPMENT

The resource value maps (Figures 4, 6, 7, and 9-12) provide a visual reference for the distribution and relative value of geographic areas with respect to cultural and natural resources as well as wilderness and areas reserved for scientific study. Park staff reviewed the datasets available for inclusion and determined which would be included in the analysis. Several datasets were created specifically for the analysis. For example, data on permanent water courses and active springs were used as proxy estimates of the spatial extent of aquatic stream habitats and riparian vegetation in the wildlife analysis and vegetation analysis. All datasets were assigned an ordinal “Resource Value” (low = 1, moderate = 2, high = 3, extremely high = 9).

The datasets existed in Resource Management GIS files as vector files. The point and line features were buffered and the buffered vector data converted to raster datasets using ArcGIS 9.3 (Analysis Tools\_Proximity\_Buffer and Conversion Tools\_To Raster\_Polygon to Raster). The raster extent was set to the park boundary extent and NoData fields transformed to “0” value using Spatial Analyst tools\_Raster calculator. The resulting raster dataset was exported as a GRID file. After converting all appropriate vector datasets to raster grids, the data for each resource type were summed (Spatial Analyst Tools\_Raster calculator) and the symbology of the resulting raster set to 5 classes (Natural Breaks) using a “Slope” color scheme. The same process was used to create the total resource value distribution map using the calculated raster datasets for cultural and natural resources as well as rasters for wilderness, proposed wilderness, and research natural areas.

The Viewshed analysis map (Figure 8) was based on observation points and line segments deemed important by park personnel based on their knowledge of the resource. Observation points based on legacy data (drawn from popular and scientific literature) were also included in the analysis.

King\_PlateViewSheds - a point feature class with seven points inside the park.

Viewshed\_Park - a point feature class with twenty-seven points both inside and outside the park.

ViewshedLines - a line feature class of selected sections of roadways both inside and outside the park.

Each of the three resulting calculations resulted in grids having one of two values being assigned to each cell site in the grid: 1 = visible and 0 = not visible.

These three grids were then combined using the + tool in the Spatial Analyst Raster Calculator. In the resulting final grid, each of the cell sites has one of four calculated values depending on whether it is visible from all three of the observation areas, from two of the areas, from only one of the areas, or not visible from any of three areas.

## APPENDIX H: SPECIAL STATUS SPECIES

Taxa Category (A)mphibian (B)ird (F)ish (M)ammal (R)eptile (I)nvertebrate Animal (V)ascular Plant (N)on-vascular Plant (O)ther	Scientific Name	Common Name(s)	FY08 Status (At Desired Condition on Sep. 30, 2008?) (Y)es (N)o (U)nknown	ESA (CA) Candidate (DM) Delisted- Monitored (M) Managed- Not Listed (PE) Proposed Endangered (PT) Proposed Threatened	Not-ESA (MD) Mgmt. Document (SL) State Listed (LL) Locally Listed (O) Other	SOMC Type Details	Desired Condition Desc.
Bird	<i>Athene cunicularia hypugea</i>	Western burrowing owl	U		O	Bird watchlist	Under Developmt.
Bird	<i>Buteo regalis</i>	Ferruginous hawk	U		O	Bird watchlist	Under Developmt.
Bird	<i>Coccyzus americanus</i>	Yellow-billed cuckoo	U	CA	O	Candidate for listing	Under Developmt.
Bird	<i>Cyrtonyx montezumae</i>	Montezuma quail	U		O	Bird watchlist	Under Developmt.
Bird	<i>Falco peregrinus</i>	American peregrine falcon	U	DM	SL	Delisted monitoring	Under Developmt.
Bird	<i>Lanius ludovicianus</i>	Loggerhead shrike	U		O	Bird watchlist	Under Developmt.
Bird	<i>Meleagris gallopavo</i>	Merriam's turkey	N		O	On the brink of extirpation	Under Developmt.
Fish	<i>Oncorhynchus mykiss</i>	Rainbow trout	U		O	historic association	Under Developmt.
Invertebrate Animal	<i>Cincindela politula petrophila</i>	Guadalupe Mountains tiger beetle	U		O	endemic	Under Developmt.
Mammal	<i>Ammotragus lervia</i>	Barbary sheep	N	M	O	exotic	Under Developmt.
Mammal	<i>Antilocapra americana</i>	Pronghorn	U		O	desire to restore park population	Under Developmt.
Mammal	<i>Bassariscus astutus</i>	Ringtail	U		O	species of visitor interest	Under Developmt.
Mammal	<i>Cervus elaphus</i>	Elk	U		O	species of visitor interest	Under Developmt.
Mammal	<i>Cynomys ludovicianus</i>	Black-tailed prairie dog	N		O	extirpated - desire to restore	Under Developmt.
Mammal	<i>Euderma maculatum</i>	Spotted bat	U		SL	watchlist	Under Developmt.
Mammal	<i>Eutamias canipes</i>	Gray-footed chipmunk	U		O	watchlist	Under Developmt.

Mammal	<i>Felis concolor</i>	Mountain lion	U		O	species of visitor interest	Under Developmt.
Mammal	<i>Microtus mogollonensis</i>	Mogollon vole	U		O	watchlist	Under Developmt.
Mammal	<i>Odocoileus hemionus</i>	Mule deer	U		O	species of visitor interest	Under Developmt.
Mammal	<i>Ovis canadensis</i>	Desert bighorn sheep	N		O	extirpated - desire to restore	Under Developmt.
Mammal	<i>Plecotus townsendii</i>	Townsend's big-eared bat	U		O	watchlist	Under Developmt.
Mammal	<i>Sus scrofa</i>	Feral hog	N	M	O	exotic	Under Developmt.
Mammal	<i>Sylvilagus floridanus</i>	Guadalupe Mountains cottontail	U		O	watchlist	Under Developmt.
Mammal	<i>Taxidea taxus</i>	Badger	U		O	species of visitor interest	Under Developmt.
Mammal	<i>Tayassu tajacu</i>	Javelina	U		O	species of visitor interest	Under Developmt.
Mammal	<i>Thomomys bottae guadalupensis</i>	Guadalupe southern pocket gopher	U		O	endemic	Under Developmt.
Mammal	<i>Ursus americanus</i>	Black bear	U		SL	species of visitor interest	Under Developmt.
Reptile	<i>Holbrookia maculata</i>	Lesser earless lizard	U		O	endemic	Under Developmt.
Reptile	<i>Lampropeltis alterna</i>	Gray-banded kingsnake	U		O	at extent of range	Under Developmt.
Reptile	<i>Phrynosoma cornutum</i>	Texas horned lizard	U		SL	watchlist	Under Developmt.
Reptile	<i>Phrynosoma douglasi hernandesi</i>	Mountain short-horned lizard	U		SL	watchlist	Under Developmt.
Vascular Plant	<i>Agave glomeruliflora</i>	Chisos Mountains agave	U		O	endemic	Under Developmt.
Vascular Plant	<i>Aquilegia chrysantha chaplinei</i>	Chapline's columbine	U		O	endemic	Under Developmt.
Vascular Plant	<i>Arbutus xalapensis</i>	Texas madrone	U		O	species of visitor interest	Under Developmt.
Vascular Plant	<i>Astragalus gypsodes</i>	Gypsum milkvetch	U		O	endemic	Under Developmt.
Vascular Plant	<i>Carex mckittrickensis</i>	McKittrick sedge	U		O	endemic	Under Developmt.
Vascular Plant	<i>Cenchrus incertus</i>	Grass sandbur	U		O	nuisance native species	Under Developmt.

Vascular Plant	<i>Centaurea melitensis</i>	Malta starthistle	N	M	O	exotic	Under Developmt.
Vascular Plant	<i>Chaetopappa hersheyi</i>	Mat leastdaisy	U		O	endemic	Under Developmt.
Vascular Plant	<i>Cryptantha paysonii</i>	Payson's cryptantha	U		O	endemic	Under Developmt.
Vascular Plant	<i>Datura quercifolia</i>	Oakleaf thornapple	U		O	nuisance native species	Under Developmt.
Vascular Plant	<i>Echinocereus lloydii</i>	Lloyd's hedgehog cactus	U		O	endemic	Under Developmt.
Vascular Plant	<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>texensis</i>	Guadalupe rabbitbrush	U		O	endemic	Under Developmt.
Vascular Plant	<i>Escobaria dasyacantha</i> var. <i>dasyacantha</i>	Big Bend foxtail cactus	U		O	watchlist	Under Developmt.
Vascular Plant	<i>Escobaria guadalupensis</i>	Guadalupe pincushion cactus	U		O	endemic	Under Developmt.
Vascular Plant	<i>Festuca ligulata</i>	Guadalupe fescue	U		O	extirpated - desire to restore	Under Developmt.
Vascular Plant	<i>Hedeoma apiculata</i>	McKittrick pennyroyal	U		O	endemic	Under Developmt.
Vascular Plant	<i>Hexalectris nitida</i>	Glass Mountains crested coralroot	U		O	watchlist	Under Developmt.
Vascular Plant	<i>Hexalectris revoluta</i>	Chisos coral-root	U		O	watchlist	Under Developmt.
Vascular Plant	<i>Hexalectris warnockii</i>	Texas crested coralroot	U		O	watchlist	Under Developmt.
Vascular Plant	<i>Hymenopappus biennis</i>	Biennial woolywhite	U		O	watchlist	Under Developmt.
Vascular Plant	<i>Lepidospartum burgessii</i>	Gypsum scalebroom	U		O	endemic	Under Developmt.
Vascular Plant	<i>Lesquerella valida</i>	Scaly bladderpod	U		O	watchlist	Under Developmt.
Vascular Plant	<i>Lycium texanum</i>	Texas wolf-berry	U		O	watchlist	Under Developmt.
Vascular Plant	<i>Marrubium vulgare</i>	Horehound	N	M	O	exotic	Under Developmt.
Vascular Plant	<i>Nama xylopodum</i>	Yellowseed fiddleleaf	U		O	watchlist	Under Developmt.
Vascular Plant	<i>Nolina arenicola</i>	Trans-Pecos beargrass	U		O	watchlist	Under Developmt.
Vascular Plant	<i>Opuntia polyacantha</i> var. <i>polyacantha</i>	El Paso prickly-pear	U		O	watchlist	Under Developmt.
Vascular Plant	<i>Peganum harmala</i>	African rue	N	M	O	exotic	Under Developmt.

Vascular Plant	Peniocereus greggii var. greggii	night-blooming cereus	U		O	watchlist	Under Developmt.
Vascular Plant	Penstemon cardinalis regalis	Cardinal penstemon	U		O	endemic	Under Developmt.
Vascular Plant	Perityle fosteri	Foster's rockdaisy	U		O	watchlist	Under Developmt.
Vascular Plant	Perityle quinqueflora	Five-flowered rockdaisy	U		O	endemic	Under Developmt.
Vascular Plant	Phoradendron villosum	Oak mistletoe	U		O	nuisance native species	Under Developmt.
Vascular Plant	Pinaropappus parvus	Dwarf rock lettuce	U		O	watchlist	Under Developmt.
Vascular Plant	Polygala rimulicola	Rock crevice milkwort	U		O	endemic	Under Developmt.
Vascular Plant	Populus tremuloides	Quaking aspen	U		O	at extent of range	Under Developmt.
Vascular Plant	Prunus murrayana	Murray's plum	U		O	watchlist	Under Developmt.
Vascular Plant	Pseudoclapia watsonii	Watson's false clapdaisy	U		O	watchlist	Under Developmt.
Vascular Plant	Salsola tragus	Spiny Russian thistle	N	M	O	exotic	Under Developmt.
Vascular Plant	Salvia lycioides	Canyon sage	U		O	watchlist	Under Developmt.
Vascular Plant	Salvia summa	Mountain Sage	U		O	watchlist	Under Developmt.
Vascular Plant	Sclerocactus papyracanthus	Paper-spine cactus	U		O	watchlist	Under Developmt.
Vascular Plant	Scutellaria laevis	Smooth-stem skullcap	U		O	watchlist	Under Developmt.
Vascular Plant	Senecio warnockii	Warnock's groundsel	U		O	watchlist	Under Developmt.
Vascular Plant	Sophora gypsophila guadalupensis	Guadalupe Mountain laurel	U		O	endemic	Under Developmt.
Vascular Plant	Streptanthus sparsiflorus	Few-flowered jewelflower	U		O	endemic	Under Developmt.
Vascular Plant	Symphoricarpos guadalupensis	McKittrick snowberry	U		O	endemic	Under Developmt.
Vascular Plant	Symphyotrichum laeve var. geyeri	Geyer's aster	U		O	at extent of range	Under Developmt.
Vascular Plant	Valeriana texana	Texas valerian	U		O	watchlist	Under Developmt.
Vascular Plant	Verbascum thapsus	Common mullein	N	M	O	exotic	Under Developmt.
Vascular Plant	Viola guadalupensis	Guadalupe Mountains violet	U		O	endemic	Under Developmt.



# APPENDIX I: COST ESTIMATES FOR ALL COMPREHENSIVE STRATEGIES ACTIVITIES

All activities that comprise the comprehensive strategies were cost estimated by determining the position types and number of hours necessary to accomplish the task. Standard federal position classifications were used and 2008 General Schedule (GS) and Wage Grade (WG) rates were used to calculate labor costs. The cost of equipment and supplies were also included if known. The cost of inflation was accounted for by adjusting annual labor rates by 3.1%.

## LEGEND FOR COST SPREADSHEET

### Resource Type

- GR = Geologic resources (Capitan Reef and related deposits)
- CK = Caves and karst
- VSV = Visibility and scenic vistas
- WC = Wilderness character (dark night skies and natural sounds)
- Hydrol = Natural hydrologic processes
- NCDB = Northern Chihuahuan Desert biotic communities and natural diversity
- CR = Cultural resources (including archeological resources, ranching landscape, Wallace Pratt properties, and other cultural landscapes)
- MCA = Museum collection activities
- OPN = Other park needs (activities for resource management program administration)

RES. TYPE	ACTIVITY #	GS Rate	2009	COL	2010	COL	2011	COL	2012	COL	2013	COL	2014	COL	2015	COL	2016	COL	2017	COL	2018
GR	1	Hours and funding included in activity 2																			
GR	2																				
GR	2	Super_14	465	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	2	Chief, Geologic Res_12	3,153	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	2	S. Bio-Tech_5	15,080	467	15,547	482	16,029	497	16,526	512	17,039	528	17,567	545	18,111	561	18,673	579	19,252	597	19,849
GR	2	GL Ranger_09	15,595	483	16,078	498	16,577	514	17,090	530	17,620	546	18,166	563	18,730	581	19,310	599	19,909	617	20,526
GR	3		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	3	Chief, Geologic Res_12	9,854	305	10,159	315	10,474	325	10,799	335	11,134	345	11,479	356	11,835	367	12,202	378	12,580	390	12,970
GR	4		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	4	Chief, Geologic Res_12	9,854	305	10,159	315	10,474	325	10,799	335	11,134	345	11,479	356	11,835	367	12,202	378	12,580	390	12,970
GR	5		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
GR	5	GL Ranger_09	15,595	483	16,078	498	16,577	514	17,090	530	17,620	546	18,166	563	18,730	581	19,310	599	19,909	617	20,526
GR	6		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	6	Chief, Geologic Res_12	5,124	159	5,283	164	5,447	169	5,616	174	5,790	179	5,969	185	6,154	191	6,345	197	6,542	203	6,744
GR	6	WG_06	360	11	371	12	383	12	395	12	407	13	419	13	432	13	446	14	460	14	474
GR	7		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	7	Chief, Geologic Res_12	2,365	73	2,438	76	2,514	78	2,592	80	2,672	83	2,755	85	2,840	88	2,928	91	3,019	94	3,113
GR	7	Data Manager_09	2,254	70	2,323	72	2,395	74	2,470	77	2,546	79	2,625	81	2,707	84	2,791	87	2,877	89	2,966
GR	8		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
GR	8	Chief, Geologic Res_12	1,971	61	2,032	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	8	Data Manager_09	1,502	47	1,549	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	9	NRPC Support	2,938	0	0	0	0	0	0	0	0	0	0	0	0	0	1,838	57	1,895	59	1,954
GR	9	Chief, Geologic Res_12	3,942	0	0	0	0	0	0	0	0	0	0	0	0	0	4,881	0	0	0	0
GR	9	Biologists_9	1,950	0	0	0	0	0	0	0	0	0	0	0	0	0	2,415	75	2,490	77	2,567
GR	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	10	Chief, Geologic Res_12	591	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	11		*	*	*360	*	*360	*	*360	*	*	*	*	*	*	*	*	*	*	*	*
GR	11	Super_14	0	0	3,599	112	3,711	115	3,826	0	0	0	0	0	0	0	0	0	0	0	0
GR	11	Chief, Geologic Res_12	0	0	6,096	189	6,285	195	6,480	0	0	0	0	0	0	0	0	0	0	0	0
GR	11	Chief, Biological Res_12	0	0	2,776	86	2,862	89	2,951	0	0	0	0	0	0	0	0	0	0	0	0
GR	11	Chief, L.E_12	0	0	2,658	82	2,740	85	2,825	0	0	0	0	0	0	0	0	0	0	0	0
GR	11	Chief, Cultural Res_12	0	0	2,846	88	2,934	91	3,025	0	0	0	0	0	0	0	0	0	0	0	0
GR	12		0	0	0	0	0	0	*1664	0	0	0	0	0	0	0	0	0	*1664	0	0
GR	12	Proj Inv_12	*23920	0	0	0	0	0	*26215	0	0	0	0	0	0	0	0	0	0	0	0
GR	12	Chief, Geologic Res_12	3,942	0	0	0	0	0	4,320	0	0	0	0	0	0	0	0	0	5,032	0	0
GR	12	Chief, Biological Res_12	359	0	0	0	0	0	393	0	0	0	0	0	0	0	0	0	458	0	0
GR	12	Chief, Cultural Res_12	368	0	0	0	0	0	403	0	0	0	0	0	0	0	0	0	470	0	0
GR	12	Chief, L.E_12	344	0	0	0	0	0	377	0	0	0	0	0	0	0	0	0	439	0	0
GR	12	S. Bio-Tech_7	9,360	0	0	0	0	0	10,258	0	0	0	0	0	0	0	0	0	11,949	0	0
GR	12	S. Bio-Tech_7	9,360	0	0	0	0	0	10,258	0	0	0	0	0	0	0	0	0	11,949	0	0
GR	13		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	13	S. Bio-Tech_5	0	0	15,547	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	13	S. Bio-Tech_5	0	0	15,547	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	13	Data Manager_09	0	0	3,098	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	13	Int Ranger_09	0	0	2,722	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	14	COVERED UNDER 170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

RES. TYPE	ACTIVITY #	GS Rate	2009	COL	2010	COL	2011	COL	2012	COL	2013	COL	2014	COL	2015	COL	2016	COL	2017	COL	2018
GR	15	COVERED UNDER 175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	16	Chief, Geologic Res_12	80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,848
GR	16	Proj Invest_12	320	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,393
GR	16	Phy_Sci_Techs_7	640	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,355
GR	16	Data Manager_09	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	796
GR	17			0	*20	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0
GR	17	Chief, Geologic Res_12	985	31	1,016	0	0	0	0	0	0	0	0	0	1,183	0	0	0	0	0	0
GR	18		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
GR	18	Chief, Geologic Res_12	2,938	91	1,515	47	1,561	48	1,610	0	0	0	0	0	0	0	0	0	0	0	0
GR	18	Chief, Cultural Res_12	1,469	46	1,515	47	1,561	48	1,610	0	0	0	0	0	0	0	0	0	0	0	0
GR	18	Proj Invest_12	1,469	46	1,515	94	3,217	100	3,317	0	0	0	0	0	0	0	0	0	0	0	0
GR	18	Phy_Sci_Techs_7	0	0	3,415	106	3,521	109	3,630	0	0	0	0	0	0	0	0	0	0	0	0
GR	18	Data Manager_09	0	0	627	19	646	20	666	0	0	0	0	0	0	0	0	0	0	0	0
GR	19		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
GR	19	Super_14	116	4	120	4	124	4	128	4	131	4	136	4	140	0	0	0	0	0	0
GR	19	Chief, Geologic Res_12	394	394	788	24	813	25	838	26	864	27	891	28	918	0	0	0	0	0	0
GR	19	Data Manager_09	300	300	601	19	620	19	639	20	659	20	679	21	700	0	0	0	0	0	0
GR	19	Proj Inv_12	5,520	5,520	11,040	342	11,382	353	11,735	364	12,099	375	12,474	387	12,861	0	0	0	0	0	0
GR	19	S. Bio-Tech_7	2,160	2,160	4,320	134	4,454	138	4,592	142	4,734	147	4,881	151	5,032	0	0	0	0	0	0
GR	20		*	*	*	*	*	*	*240	*	*240	*	*240	*	*	*	*	*	*	*	*
GR	20	Chief, Geologic Res_12	0	0	0	0	0	0	4,320	134	4,454	138	4,592	0	0	0	0	0	0	0	0
GR	20	Chief, Biological Res_12	0	0	0	0	0	0	3,816	118	3,934	122	4,056	0	0	0	0	0	0	0	0
GR	20	Chief, Cultural Res_12	0	0	0	0	0	0	3,912	121	4,033	125	4,158	0	0	0	0	0	0	0	0
GR	20	Chief, L.E_12	0	0	0	0	0	0	3,654	113	3,767	117	3,884	0	0	0	0	0	0	0	0
GR	20	Super_14	0	0	0	0	0	0	4,947	153	5,100	158	5,258	0	0	0	0	0	0	0	0
GR	21		*	*	*	*	*	*	*	*	*	*	*	*	*		136		136		136
GR	21	Chief, Geologic Res_12	1,971	61	2,032	63	2,095	65	2,160	67	2,227	69	2,296	71	2,367	73	2,440	76	2,516	78	2,594
GR	21	Chief, Biological Res_12	898	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	21	Chief, Cultural Res_12	920	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	21	Chief, L.E_12	859	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	21	Super_14	1,164	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	21	Data Manager_09	3,606	112	3,718	115	3,833	119	3,952	122	4,074	126	4,200	130	4,331	134	4,465	138	4,603	143	4,746
GR	22		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
GR	22	Chief, Geologic Res_12	0	0	1,219	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	22	Chief, Biological Res_12	0	0	1,111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GR	22	Super_14	0	0	1,440	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CK	23		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CK	23	S. Bio-Tech_5	7,540	234	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CK	23	S. Bio-Tech_5	7,540	234	7,774	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CK	24		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CK	24	Proj Inv_12	23,920	0	0	0	0	0	0	0	0	0	0	0	0	0	29,619	918	30,537	947	31,484
CK	24	S. Bio-Tech_7	18,720	0	0	0	0	0	0	0	0	0	0	0	0	0	23,180	719	23,899	741	24,639
CK	25		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CK	25	Chief, Geologic Res_12	394	12	406	13	419	13	432	13	445	14	459	14	473	15	488	15	503	16	519
CK	25	Chief, L.E_12	344	11	354	11	365	11	377	12	388	12	400	12	413	13	426	13	439	14	452
CK	26		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CK	26	Chief, Geologic Res_12	0	0	0	0	0	0	4,320	134	4,454	0	0	0	0	0	0	0	0	0	0
CK	26	Chief, Biological Res_12	0	0	0	0	0	0	1,967	61	2,028	0	0	0	0	0	0	0	0	0	0
CK	26	Chief, Cultural Res_12	0	0	0	0	0	0	2,016	62	2,078	0	0	0	0	0	0	0	0	0	0
CK	26	Chief, L.E_12	0	0	0	0	0	0	1,884	58	1,942	0	0	0	0	0	0	0	0	0	0
CK	26	Super_14	0	0	0	0	0	0	2,550	79	2,629	0	0	0	0	0	0	0	0	0	0
CK	27		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CK	27	Chief, Geologic Res_12	881	27	908	28	936	29	965	30	995	31	1,026	32	1,058	33	1,091	34	1,125	35	1,160

RES. TYPE	ACTIVITY #	GS Rate	2009	COL	2010	COL	2011	COL	2012	COL	2013	COL	2014	COL	2015	COL	2016	COL	2017	COL	2018
	27	Data Manager_09	608	19	627	19	646	20	666	21	687	21	708	22	730	23	753	23	776	24	800
	27	Phy_Sci_Techs_7	828	26	854	26	880	27	907	28	936	29	965	30	994	31	1,025	32	1,057	33	1,090
CK	28		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CK	28	Data Manager_09	11,719	363	12,082	375	12,457	386	12,843	398	13,241	410	13,651	423	14,074	436	14,511	450	14,961	464	15,424
CK	28	Chief, Geologic Res_12	985	31	1,016	31	1,047	32	1,080	33	1,113	35	1,148	36	1,183	37	1,220	38	1,258	39	1,297
CK	29		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CK	29	S. Bio-Tech_7	0	0	0	0	0	0	10,258	318	10,576	328	10,904								
CK		S. Bio-Tech_7	0	0	0	0	0	0	10,258	318	10,576	328	10,904								
CK	29	Proj Inv_12	0						*23920												
CK	30		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CK	30	Chief, L.E_12	344	11	354	11	365	11	377	12	388	12	400	12	413	13	426	13	439	14	452
GR	31		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	80
MCA	31	Data Manager_09	3,005	93	3,098	96	3,194	99	3,293	102	3,395	105	3,500	109	3,609	112	3,721	115	3,836	119	3,955
VSV	32		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
VSV	32	Chief, Geologic Res_12	591	18	610	19	628	19	648	20	668	21	689	21	710	22	732	23	755	23	778
VSV	32b		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
VSV	32b	GL Ranger_09	3,825	119	3,944	122	4,066	126	4,192	130	4,322	134	4,456	138	4,594	142	4,736	147	4,883	151	5,035
VSV	33		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
VSV	33	Chief, Biological Res_12	0	0	0	0	382	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VSV	33	Super_14	0	0	0	0	495	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VSV	34	Combined w/other activities	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
VSV	35	Combined w/other activities	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
VSV	36	Combined w/other activities	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
VSV	37		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
VSV	37	Int Ranger_09	1,980	61	2,041	63	1,053	33	1,086	34	1,119	35	1,154	36	1,190	37	1,227	38	1,265	39	1,304
VSV	38		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
VSV	38	Super_14	698	22	720	22	742	23	765	24	789	24	813	25	839	26	865	27	891	28	919
VSV	39		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	16
VSV	39	Chief, Biological Res_12	269	0	0	0	0	0	295	0	0	0	0	0	323	0	0	0	0	0	354
VSV	39	Super_14	349	0	0	0	0	0	383	0	0	0	0	0	420	0	0	0	0	0	460
VSV	39	Int Ranger_09	924	0	0	0	0	0	1,013	0	0	0	0	0	1,110	0	0	0	0	0	1,216
VSV	40		*40						*16						16						16
VSV	40	Chief, Geologic Res_12	296	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VSV	40	Super_14	349	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VSV	41		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
VSV	41	Chief, Biological Res_12	0	0	0	0	0	0	492	0	0	0	523	0	0	0	0	0	0	0	0
VSV	41	Chief, Maintenance_12	0	0	0	0	0	0	477	0	0	0	507	0	0	0	0	0	0	0	0
VSV	41	Super_14	0	0	0	0	0	0	638	0	0	0	678	0	0	0	0	0	0	0	0
VSV	42		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
VSV	42	Super_14	1,745	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VSV	43		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
VSV	43	Data Manager_09	1,502	47	1,549	48	1,597	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VSV	43	Proj Inv_12	*1840	0	0	0	*1840	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VSV	43	Chief, Biological Res_12	898	28	925	29	954	0	0	0	0	0	0	0	0	0	0	0	0	0	0

RES. TYPE	ACTIVITY #	GS Rate	2009	COL	2010	COL	2011	COL	2012	COL	2013	COL	2014	COL	2015	COL	2016	COL	2017	COL	2018
VSV	44		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
VSV	44	Super_14	698	22	720	22	742	23	765	24	789	24	813	25	839	26	865	27	891	28	919
VSV	45		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
VSV	45	Super_14	0	0	0	0	0	0	0	0	0	0	4,768	0	0	0	0	0	0	0	0
VSV	45	Proj Invest 12	0	0	0	0	0	0	0	0	0	0	6,786	210	6,996	0	0	0	0	0	0
VSV	46	Combined w/other activities	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
VSV	47	Covered under activity #32	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
VSV	48	Carried out through best management practices	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
VSV	49		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
VSV	49	Chief, Biological Res_12	539	17	555	17	572	18	590	18	609	19	627	19	647	20	667	21	688	21	709
VSV	50		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
VSV	50	Super_14	698	22	720	22	742	23	765	24	789	24	813	25	839	26	865	27	891	28	919
WC	51		16	*	16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
WC	51	Int Ranger_09	528	16	544	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WC	52		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
WC	52	S. Bio-Tech_5	0	0	1,196	37	1,233	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WC	52	Int Ranger_09	0	0	2,722	84	2,806	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WC	53		*	*	*	*	*	*	*680	*	*650	*	*650	*	*650	*	*650	*	*650	*	*650
WC	53	Int Ranger_09	0	0	0	0	0	0	23,507	729	24,236	751	24,987	775	25,762	799	26,560	823	27,384	849	28,232
WC	53	Chief, Biological Res_12	0	0	0	0	0	0	984	0	0	0	0	0	0	0	0	0	0	0	0
WC	53	Super_14	0	0	0	0	0	0	638	0	0	0	0	0	0	0	0	0	0	0	0
WC	54	Carried out through best management practices	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
WC	55		0	0	*60	0	*20	0	*20	0	*20	0	*20	0	*20	0	*20	0	*20	0	*20
WC	55	Chief, Biological Res_12	0	0	925	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WC	55	Int Ranger_09	0	0	680	21	701	22	723	22	745	23	768	24	792	25	817	25	842	26	868
WC	55	Super_14	0	0	1,200	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WC	56		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
WC	56	Int Ranger_09	528	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WC	56		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WC	57	Int Ranger_09	0	0	0	0	7,016	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WC	58		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
WC	58	Chief, Biological Res_12	898	28	925	29	954	30	984	30	1,014	31	1,046	32	1,078	33	1,111	34	1,146	36	1,181
WC	58	Super_14	1,164	36	1,200	37	1,237	38	1,275	40	1,315	41	1,355	42	1,398	43	1,441	45	1,486	46	1,532
WC	58b		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
WC	58b	Chief, Biological Res_12	898	28	925	29	954	30	984	30	1,014	31	1,046	32	1,078	33	1,111	34	1,146	36	1,181
WC	58b	Super_14	1,164	36	1,200	37	1,237	38	1,275	40	1,315	41	1,355	42	1,398	43	1,441	45	1,486	46	1,532



RES. TYPE	ACTIVITY #	GS Rate	2009	COL	2010	COL	2011	COL	2012	COL	2013	COL	2014	COL	2015	COL	2016	COL	2017	COL	2018
WC	59		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
WC	59	Int Ranger_09	132	4	136	4	140	4	145	4	149	5	154	5	159	5	163	5	169	5	174
WC	60		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
WC	60	Chief, Biological Res_12	0	0	0	0	0	0	1,180	0	0	0	0	0	0	0	0	0	0	0	0
WC	60	Chief, L.E_12	0	0	0	0	0	0	1,130	0	0	0	0	0	0	0	0	0	0	0	0
WC	60	Super_14	0	0	0	0	0	0	1,530	0	0	0	0	0	0	0	0	0	0	0	0
WC	61		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
W	61	GL_Ranger_9	1,093	34	1,127	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
W	61	WG_Laborer_5	1,472	46	1,518	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
W	62	WG_Laborer_5	1,472	46	1,518	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
W	63	Combined w/other activities	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
W	64	Covered under activity #61	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
W	65	Combined w/other activities	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	66		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	66	GL Ranger_09	5,296	164	5,461	169	5,630	175	5,804	180	5,984	186	6,170	191	6,361	197	6,558	203	6,762	210	6,971
Hydrol	67		*	*	*	*	*	*	*	*	*1548	*	*1548	*	*1548	*	*	*	*	*	*
Hydrol	67	S. Bio-Tech_7	18,720	580	19,300	598	19,899	617	20,515	636	21,151	656	21,807	676	22,483	697	23,180	719	23,899	741	24,640
Hydrol	67	Chief, Geologic Res_12	25,620	794	26,415	819	27,233	844	28,078	870	28,948	897	29,846	925	30,771	954	31,725	983	32,708	1,014	33,722
Hydrol	67	Chief, Biological Res_12	1,077	33	1,111	34	1,145	35	1,180	37	1,217	38	1,255	39	1,294	40	1,334	41	1,375	43	1,418
Hydrol	67b		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	67b	Biologists_9	0	0	0	0	0	0	0	0	3,819	0	3,937	0	4,059	0	0	0	0	0	4,448
Hydrol	67b	S. Bio-Tech_5	0	0	0	0	0	0	0	0	1,704	0	1,757	0	1,811	0	0	0	0	0	1,985
Hydrol	68	Funded primarily through CHDN I&M funds	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	68	Data Manager_09	1,013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrol	69		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	69	Chief, Biological Res_12	359	11	370	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrol	69	Chief, Geologic Res_12	394	12	406	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrol	69	Chief, L.E_12	344	11	354	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrol	69	Data Manager_09	300	9	310	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrol	70		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	70	Chief, Biological Res_12	0	0	0	0	0	0	393	0	0	0	0	0	0	0	0	0	0	0	0
Hydrol	70	Chief, Geologic Res_12	0	0	0	0	0	0	432	0	0	0	0	0	0	0	0	0	0	0	0
Hydrol	70	Data Manager_09	0	0	0	0	0	0	329	0	0	0	0	0	0	0	0	0	0	0	0
Hydrol	71		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	71	WG_09	365	11	376	12	388	12	400	12	412	13	425	13	438	14	452	14	466	14	480
Hydrol	72		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	72	Proj_Invest_12 PMIS 107571	0	0	36,000	0	41,000	0	46,000	0	0	0	0	0	0	0	0	0	0	0	0
Hydrol	73		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	73	Proj_Invest_12	0	0	0	0	0	0	0	0	0	0	0	0	10,000	310	10,310	320	10,630	330	10,959
Hydrol	73	Biologist_9	0	0	0	0	0	0	0	0	0	0	0	0	20,000	620	20,620	639	21,259	659	21,918
Hydrol	73	S. Bio_Tech_7	0	0	0	0	0	0	0	0	0	0	0	0	25,000	775	25,775	799	26,574	824	27,398

RES. TYPE	ACTIVITY #	GS Rate	2009	COL	2010	COL	2011	COL	2012	COL	2013	COL	2014	COL	2015	COL	2016	COL	2017	COL	2018
Hydrol	73	Chief, Biological Res_12	0	0	0	0	0	0	0	0	0	0	0	0	5,000	155	5,155	160	5,315	165	5,480
Hydrol	74	Covered under activity #66	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	75		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	75	Chief, Geologic Res_12	3,942	122	4,064	126	4,190	130	4,320	134	4,454	138	4,592	142	4,734	147	4,881	151	5,032	156	5,188
Hydrol	76	Covered under activity #66	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	77		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	77	Super_14	0	0	0	0	0	0	0	0	3,944	122	4,066	0	0	0	0	0	0	0	0
Hydrol	77	Proj Inv_12	0	0	0	0	0	0	0	0	6,237	193	6,430	0	0	0	0	0	0	0	0
Hydrol	77	Chief, Biological Res_12	0	0	0	0	0	0	0	0	3,043	94	3,137	0	0	0	0	0	0	0	0
Hydrol	77	Chief, Geologic Res_12	0	0	0	0	0	0	0	0	3,340	104	3,444	0	0	0	0	0	0	0	0
Hydrol	77	Chief, L.E_12	0	0	0	0	0	0	0	0	2,913	90	3,003	0	0	0	0	0	0	0	0
Hydrol	78		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	78	Chief, Biological Res_12	0	0	0	0	1,560	24	804	25	829	0	0	0	0	0	0	0	0	0	0
Hydrol	78	Chief, Geologic Res_12	0	0	0	0	3,120	48	1,608	50	1,658	0	0	0	0	0	0	0	0	0	0
Hydrol	78	Biologist_9	0	0	0	0	6,454	100	3,327	103	3,430	0	0	0	0	0	0	0	0	0	0
NCDB	79		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
NCDB	79	Biologists_9	16,900	524	17,424	540	17,964	557	18,521	574	19,095	592	19,687	610	20,297	629	20,927	649	21,575	669	22,244
NCDB	79	Chief, Biological Res_12	898	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	79	Proj Inv_12	920	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	79	Chief, Cultural Res_12	1,104	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	79	Biologists_9	2,600	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	79	Data Manager_09	7,812	242	8,055	250	8,304	257	8,562	265	8,827	274	9,101	282	9,383	291	9,674	300	9,974	309	10,283
NCDB	80		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
NCDB	80	Biologists_9	0	0	0	0	0	0	2,849	88	2,937	0	0	0	0	0	0	0	0	0	0
NCDB	80	Chief, Cultural Res_12	0	0	0	0	0	0	1,210	38	1,248	0	0	0	0	0	0	0	0	0	0
NCDB	80	Chief, Biological Res_12	0	0	0	0	0	0	1,180	37	1,217	0	0	0	0	0	0	0	0	0	0
NCDB	81		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
NCDB	81	Chief, Biological Res_12	898	28	925	29	954	30	984	30	1,014	31	1,046	32	1,078	33	1,111	34	1,146	36	1,181
NCDB	81	Biologists_9	16,900	524	17,424	540	17,964	557	18,521	574	19,095	592	19,687	610	20,297	629	20,927	649	21,575	669	22,244
NCDB	81	WG 06	700	22	722	22	744	23	767	24	791	25	815	25	841	26	867	27	894	28	921
NCDB	81	WG 05	675	21	696	22	718	22	740	23	763	24	787	24	811	25	836	26	862	27	889
NCDB		Chief, Cultural Res_12	368	11	379	12	391	12	403	13	416	13	429	13	442	14	456	14	470	15	484
NCDB	82		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
NCDB	82	Chief, Geologic Res_12	394	12	406	13	419	13	432	13	445	14	459	14	473	15	488	15	503	16	519
NCDB	83		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
NCDB	83	Chief, Geologic Res_12	394	12	406	13	419	13	432	13	445	14	459	14	473	15	488	15	503	16	519
NCDB	84														<b>1,624</b>		<b>1,624</b>		<b>1,624</b>		<b>1,624</b>
NCDB	84	Proj Inv_12	0	0	0	0	0	0	0	0	0	0	0	0	28,729	891	29,620	918	30,538	947	31,484
NCDB	84	Chief, Biological Res_12	0	0	0	0	0	0	0	0	0	0	0	0	2,156	67	2,223	69	2,292	71	2,363
NCDB	84	Data Manager_07	11,440	355	11,795	366	12,160	377	12,537	389	12,926	401	13,327	413	13,740	426	14,166	439	14,605	453	15,058
NCDB	84	Data Manager_07	11,440	355	11,795	366	12,160	377	12,537	389	12,926	401	13,327	413	13,740	426	14,166	439	14,605	453	15,058
NCDB	84	Chief, Geologic Res_12	0	0	0	0	0	0	0	0	0	0	0	0	1,420	44	1,464	45	1,509	47	1,556
NCDB	85	Covered under activity #86																			
NCDB	86		*120		*24		*24		*24												
NCDB	86	Chief, Biological Res_12	1,077	33	718	22	740	23	763	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	86	Chief, Geologic Res_12	1,182	37	1,219	38	1,257	39	1,296	0	0	0	0	0	0	0	0	0	0	0	0

RES. TYPE	ACTIVITY #	GS Rate	2009	COL	2010	COL	2011	COL	2012	COL	2013	COL	2014	COL	2015	COL	2016	COL	2017	COL	2018
NCDB	86	Chief, Cultural Res_12	1,104	34	1,138	35	1,174	36	1,210	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	86	Super_14	1,396	43	1,440	45	1,484	46	1,530	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	86	Data Manager_09	901	28	929	29	958	30	988	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	87		*	*	*	*	*272	*	*	*	*	*	*	*	*	*	*	*	*272		
NCDB	87	Data Manager_09	0	0	0	0	1,278	0	0	0	0	0	0	0	0	0	0	0	1,535	0	0
NCDB	87	Chief, Geologic Res_12	0	0	0	0	1,676	0	0	0	0	0	0	0	0	0	0	0	2,013	0	0
NCDB	87	Chief, L.E_12	0	0	0	0	1,462	0	0	0	0	0	0	0	0	0	0	0	1,756	0	0
NCDB	87	Data Manager_09	0	0	0	0	1,278	0	0	0	0	0	0	0	0	0	0	0	1,535	0	0
NCDB	87	Chief, Cultural Res_12	0	0	0	0	1,565	0	0	0	0	0	0	0	0	0	0	0	1,880	0	0
NCDB	87	FMO_12	0	0	0	0	3,608	0	0	0	0	0	0	0	0	0	0	0	4,333	0	0
NCDB	87	Super_14	0	0	0	0	1,979	0	0	0	0	0	0	0	0	0	0	0	2,377	0	0
NCDB	88		*280	*	*280	*	*28	*	*28	*	*28	*	*28	*	*28	*	*28	*	*28	*	*28
NCDB	88	Prescribed Fire Spec_07	2,626	81	2,707	84	2,791	87	2,878	89	2,967	92	3,059	95	3,154	98	3,252	101	3,352	104	3,456
NCDB	88	FMO_12	2,627	81	2,708	84	2,792	87	2,879	89	2,968	92	3,060	95	3,155	98	3,253	101	3,354	104	3,458
NCDB	88	Data Manager_09	2,628	81	2,709	84	2,793	87	2,880	89	2,969	92	3,061	95	3,156	98	3,254	101	3,355	104	3,459
NCDB	89		*16	*	*16	*	*16	*	*16	*	*16	*	*16	*	*16	*	*16	*16	*	*16	*
NCDB	89	FMO_12	679	21	700	22	722	22	744	23	767	24	791	25	815	25	841	26	867	27	894
NCDB	89b		*80	*	*80	*	*80	*	*80	*	*80	*	*80	*	*80	*	*80	*	*80	*	*80
NCDB	89b	FMO_12	3,394	105	3,500	108	3,608	112	3,720	115	3,835	119	3,954	123	4,077	126	4,203	130	4,333	134	4,468
NCDB	90		*170	*	*170	*	*170	*	*170	*	*170	*	*170	*	*170	*	*170	*	*170	*	*170
NCDB	90	Prescribed Fire Spec_07	821	25	846	26	872	27	899	28	927	29	956	30	985	31	1,016	31	1,047	32	1,080
NCDB	90	Prescribed Fire Spec_07	821	25	846	26	872	27	899	28	927	29	956	30	985	31	1,016	31	1,047	32	1,080
NCDB	90	Prescribed Fire Spec_07	821	25	846	26	872	27	899	28	927	29	956	30	985	31	1,016	31	1,047	32	1,080
NCDB	90	Chief, Biological Res_12	449	14	463	14	477	15	492	15	507	16	523	16	539	17	556	17	573	18	591
NCDB	90	FMO_12	424	13	437	14	451	14	465	14	479	15	494	15	510	16	525	16	542	17	558
NCDB	90b		*320	*	*320	*	*320	*	*320	*	*320	*	*320	*	*320	*	*320	*	*320	*	*320
NCDB	90b	Prescribed Fire Spec_07	1,313	41	1,353	42	1,395	43	1,439	45	1,483	46	1,529	47	1,577	49	1,626	50	1,676	52	1,728
NCDB	90b	Prescribed Fire Spec_07	1,313	41	1,353	42	1,395	43	1,439	45	1,483	46	1,529	47	1,577	49	1,626	50	1,676	52	1,728
NCDB	90b	Prescribed Fire Spec_07	1,313	41	1,353	42	1,395	43	1,439	45	1,483	46	1,529	47	1,577	49	1,626	50	1,676	52	1,728
NCDB	90b	Prescribed Fire Spec_07	1,313	41	1,353	42	1,395	43	1,439	45	1,483	46	1,529	47	1,577	49	1,626	50	1,676	52	1,728
NCDB	91		*	*	*	*	*	*	*	*	*240		*240		*240	*	*	*	*	*	*
NCDB	91	Chief, Biological Res_12	0	0	0	0	0	0	0	0	4,057	126	4,183	130	4,312	0	0	0	0	0	0
NCDB	91	Super_14	0	0	0	0	0	0	0	0	5,259	163	5,422	168	5,590	0	0	0	0	0	0
NCDB	91	Biologists_9	0	0	0	0	0	0	0	0	2,938	91	3,029	94	3,123	0	0	0	0	0	0
NCDB	92		*	*	*	*	*	*	*	*	*	*	*	*	*240		*240		*240	*	*
NCDB	92	Chief, Biological Res_12	0	0	0	0	0	0	0	0	0	0	0	0	4,312	134	4,446	138	4,583	0	0
NCDB	92	Super_14	0	0	0	0	0	0	0	0	0	0	0	0	2,795	87	2,882	89	2,971	0	0
NCDB	92	Biologists_9	0	0	0	0	0	0	0	0	0	0	0	0	3,123	97	3,220	100	3,320	0	0
NCDB	92	Wildlife Veterinarian	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	93		*120	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
NCDB	93	Data Manager_09	1,502	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	93	Int Ranger_09	1,320	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	93	Chief, Geologic Res_12	1,971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	94			*	*	*	*	*	*	*	*1704	*	*	*	*	*	*	*	*	*	*
NCDB	94	Proj Inv_12	0	0	0	0	0	0	0	0	27,027	0	0	0	0	0	0	0	0	0	0
NCDB	94	Chief, Biological Res_12	0	0	0	0	0	0	0	0	2,028	0	0	0	0	0	0	0	0	0	0
NCDB	94	Chief, Cultural Res_12	0	0	0	0	0	0	0	0	416	0	0	0	0	0	0	0	0	0	0

RES. TYPE	ACTIVITY #	GS Rate	2009	COL	2010	COL	2011	COL	2012	COL	2013	COL	2014	COL	2015	COL	2016	COL	2017	COL	2018
NCDB	94	Chief, Geologic Res_12	0	0	0	0	0	0	0	0	445	0	0	0	0	0	0	0	0	0	0
NCDB	94	Chief, L.E_12	0	0	0	0	0	0	0	0	388	0	0	0	0	0	0	0	0	0	0
NCDB	94	S. Bio-Tech_7	0	0	0	0	0	0	0	0	10,576	0	0	0	0	0	0	0	0	0	0
NCDB	94	S. Bio-Tech_7	0	0	0	0	0	0	0	0	10,576	0	0	0	0	0	0	0	0	0	0
NCDB	94	Biologists_9	0	0	0	0	0	0	0	0	2,938	0	0	0	0	0	0	0	0	0	0
NCDB	95		*112	*	*112	*	*112	*	*	*	*	*	*	*	*	*	*	*	*	*	*
NCDB	95	Chief, Biological Res_12	1,795	56	1,851	57	1,908	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	95	Biologists_9	1,300	40	1,340	42	1,382	0	0	0	0	0	1,170	0	0	0	0	0	1,279	0	0
		S. Bio_Tech_7	0	0	0	0	0	0	0	0	0	0	956	0	0	0	0	0	1,045	0	0
NCDB	95	Chief, Geologic Res_12	1,182	37	1,219	38	1,257	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	95	Super_14	465	14	480	15	495	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	96		*	*	*	*	*	*	*1664	*	*	*	*	*	*	*	*	*	*1664	*	*
NCDB	96	Proj Inv_12	0	0	0	0	0	0	*26241	0	0	0	0	0	0	0	0	0	*30568	0	0
NCDB	96	Chief, Geologic Res_12	0	0	0	0	0	0	4,320	0	0	0	0	0	0	0	0	0	5,032	0	0
NCDB	96	Chief, Biological Res_12	0	0	0	0	0	0	393	0	0	0	0	0	0	0	0	0	458	0	0
NCDB	96	Chief, Cultural Res_12	0	0	0	0	0	0	403	0	0	0	0	0	0	0	0	0	469	0	0
NCDB	96	Chief, L.E_12	0	0	0	0	0	0	377	0	0	0	0	0	0	0	0	0	439	0	0
NCDB	96	S. Bio-Tech_7	0	0	0	0	0	0	10,258	0	0	0	0	0	0	0	0	0	11,950	0	0
NCDB	96	S. Bio-Tech_7	0	0	0	0	0	0	10,258	0	0	0	0	0	0	0	0	0	11,950	0	0
NCDB	96b		*	*	*	*	*	*	*1664	*	*	*	*	*	*	*	*	*	*1664	*	*
NCDB	96b	Proj Inv_12	0	0	0	0	0	0	*26241	0	0	0	0	0	0	0	0	0	*30568	0	0
NCDB	96b	Chief, Geologic Res_12	0	0	0	0	0	0	4,320	0	0	0	0	0	0	0	0	0	5,032	0	0
NCDB	96b	Chief, Biological Res_12	0	0	0	0	0	0	393	0	0	0	0	0	0	0	0	0	458	0	0
NCDB	96b	Chief, Cultural Res_12	0	0	0	0	0	0	403	0	0	0	0	0	0	0	0	0	469	0	0
NCDB	96b	Chief, L.E_12	0	0	0	0	0	0	377	0	0	0	0	0	0	0	0	0	439	0	0
NCDB	96b	S. Bio-Tech_7	0	0	0	0	0	0	10,258	0	0	0	0	0	0	0	0	0	11,950	0	0
NCDB	96b	S. Bio-Tech_7	0	0	0	0	0	0	10,258	0	0	0	0	0	0	0	0	0	11,950	0	0
NCDB	97						*740						*740						*740		
NCDB	97	Taxa Spec_12	0	0	0	0	1,799	0	0	0	0	0	1,972	0	0	0	0	0	2,160	0	0
NCDB	97	Taxa Spec_12	0	0	0	0	1,799	0	0	0	0	0	1,972	0	0	0	0	0	2,160	0	0
NCDB	97	Taxa Spec_12	0	0	0	0	1,799	0	0	0	0	0	1,972	0	0	0	0	0	2,160	0	0
NCDB	97	Taxa Spec_12	0	0	0	0	1,799	0	0	0	0	0	1,972	0	0	0	0	0	2,160	0	0
NCDB	97	Int Ranger_09	0	0	0	0	2,105	0	0	0	0	0	2,307	0	0	0	0	0	2,528	0	0
NCDB	97	Chief, Biological Res_12	0	0	0	0	5,725	0	0	0	0	0	6,274	0	0	0	0	0	6,876	0	0
NCDB	97	Chief, Cultural Res_12	0	0	0	0	3,912	0	0	0	0	0	4,287	0	0	0	0	0	4,698	0	0
NCDB	97	Chief, L.E_12	0	0	0	0	1,827	0	0	0	0	0	2,002	0	0	0	0	0	2,194	0	0
NCDB	97	Chief, Maintenance_12	0	0	0	0	1,850	0	0	0	0	0	2,027	0	0	0	0	0	2,221	0	0
NCDB	97	Int Ranger_09	0	0	0	0	2,105	0	0	0	0	0	2,307	0	0	0	0	0	2,528	0	0
NCDB	97	Int Ranger_09	0	0	0	0	2,105	0	0	0	0	0	2,307	0	0	0	0	0	2,528	0	0
NCDB	97	Biologists_9	0	0	0	0	2,073	0	0	0	0	0	2,272	0	0	0	0	0	2,490	0	0
NCDB	97	Super_14	0	0	0	0	989	0	0	0	0	0	1,084	0	0	0	0	0	1,188	0	0
NCDB	97	Biologists_9	0	0	0	0	2,073	0	0	0	0	0	2,272	0	0	0	0	0	2,490	0	0
NCDB	98	Performed through the CHDN I&M program	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
		Chief, Biological Res_12	4,406	137	4,543	141	4,683	145	4,829	150	4,978	154	5,133	159	5,292	164	5,456	169	5,625	174	5,799
		Biologists_9	14,179	440	14,619	453	15,072	467	15,539	482	16,021	497	16,517	512	17,029	528	17,557	544	18,102	561	18,663
		Data Manager_09	3,038	94	3,132	97	3,229	100	3,329	103	3,433	106	3,539	110	3,649	113	3,762	117	3,878	120	3,999
NCDB	99	S. Bio_Tech_7	23,184	719	23,903	741	24,644	764	25,408	788	26,195	812	27,007	837	27,845	863	28,708	890	29,598	918	30,515
NCDB	100	Covered under activities #98,99,103,104	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
NCDB	101	Covered under activities #98,99,103,104	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
NCDB	102		*832	*	*	*	*832	*	*	*	*832	*	*	*	*	*	*	*	*	*	*
NCDB	102	Chief, Geologic Res_12	1,182	37	0	0	1,257	0	0	0	1,336	0	0	0	0	0	0	0	0	0	0
NCDB	102	Data Manager_09	601	19	0	0	639	0	0	0	679	0	0	0	0	0	0	0	0	0	0

RES. TYPE	ACTIVITY #	GS Rate	2009	COL	2010	COL	2011	COL	2012	COL	2013	COL	2014	COL	2015	COL	2016	COL	2017	COL	2018
NCDB	102	Chief, Biological Res_12	1,077	33	0	0	1,145	0	0	0	1,217	0	0	0	0	0	0	0	0	0	0
NCDB	102	Biologists_9	2,600	81	0	0	2,764	0	0	0	2,938	0	0	0	0	0	0	0	0	0	0
NCDB	102	Chief, Maintenance_12	1,044	32	0	0	1,110	0	0	0	1,180	0	0	0	0	0	0	0	0	0	0
NCDB	102	Super_14	1,396	43	0	0	1,484	0	0	0	1,577	0	0	0	0	0	0	0	0	0	0
NCDB	102	WG_06	2,880	89	0	0	3,061	0	0	0	3,254	0	0	0	0	0	0	0	0	0	0
NCDB	102	WG_09	16,370	507	0	0	17,400	0	0	0	18,496	0	0	0	0	0	0	0	0	0	0
NCDB	102	WG_05	2,701	84	0	0	2,871	0	0	0	3,052	0	0	0	0	0	0	0	0	0	0
NCDB	102	WG_05	2,701	84	0	0	2,871	0	0	0	3,052	0	0	0	0	0	0	0	0	0	0
NCDB	103		*832	*	*832	*	*832	*	*832	*	*832	*	*832	*	*832	*	*832	*	*832	*	*832
NCDB	103	Chief, Biological Res_12	3,590	111	3,702	115	3,816	118	3,935	122	4,057	126	4,183	130	4,312	134	4,446	138	4,584	142	4,726
NCDB	103	Biologists_9	7,800	242	8,042	249	8,291	257	8,548	265	8,813	273	9,086	282	9,368	290	9,658	299	9,958	309	10,267
NCDB	103	Proj Inv_12	11,040	342	11,382	353	11,735	364	12,099	375	12,474	387	12,861	399	13,259	411	13,670	424	14,094	437	14,531
NCDB	103	Super_14	1,862	58	1,919	60	1,979	61	2,040	63	2,104	65	2,169	67	2,236	69	2,305	71	2,377	74	2,450
NCDB	103	S. Bio-Tech_7	4,320	134	4,454	138	4,592	142	4,734	147	4,881	151	5,032	156	5,188	161	5,349	166	5,515	171	5,686
NCDB	104		*	*	*	*	*	*	*	*	*850	*	*850	*	*850	*	*850	*	*850	*	*850
NCDB	104	S. Bio-Tech_7	0	0	0	0	0	0	0	0	8,644	268	8,912	276	9,188	285	9,473	294	9,767	303	10,070
NCDB	104	Biologists_9	0	0	0	0	0	0	0	0	15,607	484	16,091	499	16,590	514	17,104	530	17,634	547	18,181
NCDB	105		*60	*	*60	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
NCDB	105	Data Manager_09	751	23	774	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	105	Chief, Biological Res_12	898	28	925	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	105	Biologists_9	650	20	670	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	106	Covered under activity #103	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
NCDB	107		*	*	*	*	*	*	*	*	*	*	*	*	160	*	160	*	160	*	160
NCDB	107	Chief, Biological Res_12	0	0	0	0	0	0	0	0	0	0	0	0	2,156	67	2,223	69	2,292	71	2,363
NCDB	107	Chief, Geologic Res_12	0	0	0	0	0	0	0	0	0	0	0	0	2,367	73	2,440	76	2,516	78	2,594
NCDB	107	Biologists_9	0	0	0	0	0	0	0	0	0	0	0	0	1,561	48	1,609	50	1,659	51	1,710
NCDB	107	Data Manager_09	0	0	0	0	0	0	0	0	0	0	0	0	1,804	56	1,860	58	1,918	59	1,977
NCDB	108	To be accomplished in outyears 2019 through 2023	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	109	Archeological Inventory Project Funds	*	*	*	*	*	*	*	*	300,000	*	*	*	*144	*	*144	*	*	*	*
CR	109	Chief, Cultural Res_12	0	0	0	0	0	0	0	0	0	0	0	0	4,420	137	4,557	0	0	0	0
CR	109	Chief, Biological Res_12	0	0	0	0	0	0	0	0	0	0	0	0	2,156	67	2,223	0	0	0	0
CR	109	Super_14	0	0	0	0	0	0	0	0	0	0	0	0	559	17	576	0	0	0	0
CR	109	Data Manager_09	0	0	0	0	0	0	0	0	0	0	0	0	722	22	744	0	0	0	0
CR	109a		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	109a	Chief, Cultural Res_12	1,469	*	*	*	1,560	*	*	*	1,657	*	*	*	1,759	*	*	*	1,868	*	*
CR	110		*160	*	*	*	*160	*	*	*	*160	*	*	*	*	*	*160	*	*	*	*
CR	110	Proj Inv_12	3,680	0	0	0	3,912	0	0	0	4,158	0	0	0	0	0	4,557	0	0	0	0
CR	110	Data Manager_07	1,760	0	0	0	1,871	0	0	0	1,989	0	0	0	0	0	2,180	0	0	0	0
CR	111		*320	*	*320	*	*320	*	*320	*	*320	*	*320	*	*320	*	*320	*	*320	*	*320
CR	111	S. Bio-Tech_7	2,880	89	2,969	92	3,061	95	3,156	98	3,254	101	3,355	104	3,459	107	3,566	111	3,677	114	3,791
CR	111	Chief, Cultural Res_12	7,360	228	7,588	235	7,823	243	8,066	250	8,316	258	8,574	266	8,840	274	9,114	283	9,396	291	9,687
CR	112		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	112	Chief, Cultural Res_12	3,680	114	3,794	118	3,912	121	4,033	125	4,158	129	4,287	133	4,420	137	4,557	141	4,698	146	4,844
CR	113		*120	*	*120	*	*120	*	*120	*	*120	*	*120	*	*120	*	*120	*	*120	*	*120
CR	113	Chief, Cultural Res_12	5,520	171	5,691	176	5,868	182	6,049	188	6,237	193	6,430	199	6,630	206	6,835	212	7,047	218	7,266
CR	114		*60	*	*60	*	*60	*	*60	*	*60	*	*60	*	*60	*	*60	*	*60	*	*60
CR	114	Chief, Cultural Res_12	2,760	86	2,846	88	2,934	91	3,025	94	3,118	97	3,215	100	3,315	103	3,418	106	3,524	109	3,633
CR	115		*40	*	*40	*	*40	*	*40	*	*40	*	*40	*	*40	*	*40	*	*40	*	*40



RES. TYPE	ACTIVITY #	GS Rate	2009	COL	2010	COL	2011	COL	2012	COL	2013	COL	2014	COL	2015	COL	2016	COL	2017	COL	2018
CR	115	Chief, Cultural Res_12	1,840	57	1,897	59	1,956	61	2,016	63	2,079	64	2,143	66	2,210	69	2,278	71	2,349	73	2,422
CR	116		124		124		124		124		124		124		124		124		124		124
CR	116	Chief, Cultural Res_12	3,680	114	3,794	118	3,912	121	4,033	125	4,158	129	4,287	133	4,420	137	4,557	141	4,698	146	4,844
CR	116	Chief, Biological Res_12	898	28	925	29	954	30	984	30	1,014	31	1,046	32	1,078	33	1,111	34	1,146	36	1,181
CR	116	Super_14	465	14	480	15	495	15	510	16	526	16	542	17	559	17	576	18	594	18	613
CR	116	Data Manager_09	601	19	620	19	639	20	659	20	679	21	700	22	722	22	744	23	767	24	791
CR	117		*	*	*180	*	*	*	*180	*	*	*	*180	*	*	*	*180	*	*	*	*
CR	117	Chief, Cultural Res_12	0	0	2,846	0	0	0	3,025	0	0	0	3,215	0	0	0	3,417	0	0	0	0
CR	117	Proj Inv_12	0	0	5,691	0	0	0	6,049	0	0	0	6,430	0	0	0	6,835	0	0	0	0
CR	118	Vegetation management on cultural sites (mainly FirePro funded)	*	*	*	*	*80	*	*	*	*	*	*	*	*	*	*	*	*	*	*80
CR	118	Chief, Biological Res_12	0	0	0	0	1,908	0	1,908	59	1,967	61	2,028	63	2,091	65	2,156	67	2,223	69	2,368
CR	118	FMO_12	0	0	0	0	1,804	0	1,804	56	1,860	58	1,918	59	1,977	61	2,038	63	2,102	65	2,234
	Activity numberw 119-127 were never assigned																				
CR	128		*120	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	128	Chief, Cultural Res_12	2,760	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	128	Proj Inv_12	2,760	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	129		*	*	*120	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	129	Chief, Cultural Res_12	2,760	86	2,846	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	129	Proj Inv_12	2,760	86	2,846	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	130		*	*	*	*	*120	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	130	Chief, Cultural Res_12	0	0	0	0	2,934	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	130	Proj Inv_12	0	0	0	0	2,934	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	131		*	*	*	*	*	*	*120	*	*	*	*	*	*	*	*	*	*	*	*
CR	131	Chief, Cultural Res_12	0	0	0	0	0	0	3,025	0	0	0	0	0	0	0	0	0	0	0	0
CR	131	Proj Inv_12	0	0	0	0	0	0	3,025	0	0	0	0	0	0	0	0	0	0	0	0
CR	132		*	*	*	*	*	*	*	*	*120	*	*	*	*	*	*	*	*	*	*
CR	132	Chief, Cultural Res_12	0	0	0	0	0	0	0	0	3,118	0	0	0	0	0	0	0	0	0	0
CR	132	Proj Inv_12	0	0	0	0	0	0	0	0	3,118	0	0	0	0	0	0	0	0	0	0
CR	133		*285	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	133	Chief, Cultural Res_12	2,760	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	133	Proj Inv_12	*10350	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	134		*176	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	134	Chief, Cultural Res_12	5,520	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	134	Chief, Biological Res_12	1,795	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	134	Super_14	931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	135		*168	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	135	Proj Inv_12	*5520	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	135	Chief, Cultural Res_12	736	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	135	Chief, Biological Res_12	718	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	135	Super_14	931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	136		*108	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	136	Proj Inv_12	2,760	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	136	Chief, Cultural Res_12	736	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	136	Chief, Biological Res_12	718	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	136	Super_14	931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	137		*40	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	137	Chief, Cultural Res_12	1,104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	137	Chief, Biological Res_12	359	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	137	Super_14	465	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

RES. TYPE	ACTIVITY #	GS Rate	2009	COL	2010	COL	2011	COL	2012	COL	2013	COL	2014	COL	2015	COL	2016	COL	2017	COL	2018
CR	138		*	*	*40	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	138	Chief, Cultural Res_12	0	0	1,138	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	138	Chief, Biological Res_12	0	0	370	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	138	Super_14	0	0	480	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	139		*76	*	*	*	*	*	*76	*	*	*	*	*	*	*	*	*	*	*	*
CR	139	Chief, Cultural Res_12	2,760	0	0	0	0	0	3,025	0	0	0	0	0	0	0	0	0	0	0	0
CR	139	Chief, Biological Res_12	359	0	0	0	0	0	393	0	0	0	0	0	0	0	0	0	0	0	0
CR	139	Super_14	465	0	0	0	0	0	510	0	0	0	0	0	0	0	0	0	0	0	0
CR	140		*24	*	*24	*	*24	*	*24	*	*24	*	*	*	*24	*	*	*	*	*	24
CR	140	Chief, Cultural Res_12	368	11	379	12	391	12	403	13	416	13	429	13	442	14	456	14	470	15	484
CR	140	Data Manager_09	601	19	620	19	639	20	659	20	679	21	700	22	722	22	744	23	767	24	791
CR	141		*132	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	141	Chief, Cultural Res_12	368	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	141	Data Manager_09	601	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	142		*108	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	142	Proj Inv_12	2,760	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	142	Chief, Cultural Res_12	736	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	142	Chief, Biological Res_12	718	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	142	Super_14	931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	143		*80	*	*80	*	*80	*	*80	*	0	0	0	0	*80		*80		*80		*80
CR	143	Chief, Maintenance_12	870	27	897	28	925	29	953	0	0	0	0	0	0	0	1,077	33	1,110	34	1,145
CR	143	WG_09	2,518	78	2,596	80	2,677	83	2,760	0	0	0	0	0	0	0	3,118	97	3,215	100	3,314
CR	144		250	*	250	*	250	*	250	*	250	*	250	*	250	*	250	*	250	*	250
CR	144	Chief, Maintenance_12	435	13	448	14	462	14	477	15	492	15	507	16	522	16	539	17	555	17	573
CR	144	WG_09	1,889	59	1,947	60	2,008	62	2,070	64	2,134	66	2,200	68	2,268	70	2,339	73	2,411	75	2,486
CR	144	WG_05	2,026	63	2,088	65	2,153	67	2,220	69	2,289	71	2,360	73	2,433	75	2,508	78	2,586	80	2,666
CR	145		390	*	*	*	*	*	*	*	*	*	390	*	*	*	*	*	*	*	*
CR	145	Chief, Maintenance_12	435	13	448	14	462	14	477	15	492	15	507	0	0	0	0	0	0	0	0
CR	145	WG_09	1,889	59	1,947	60	2,008	62	2,070	64	2,134	66	2,200	0	0	0	0	0	0	0	0
CR	145	WG_05	2,701	84	2,785	86	2,871	89	2,960	92	3,052	95	3,146	0	0	0	0	0	0	0	0
CR	145	WG_05	2,701	84	2,785	86	2,871	89	2,960	92	3,052	95	3,146	0	0	0	0	0	0	0	0
CR	146		*	*	*	*	16	*	*	*	*	*	*	*	16	*	*	*	*	*	*
CR	146	Int Ranger_09	264	0	0	0	281	0	0	0	0	0	0	0	317	0	0	0	0	0	0
CR	146	Biologists_9	260	0	0	0	276	0	0	0	0	0	0	0	312	0	0	0	0	0	0
CR	147		*96	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	147	Chief, Cultural Res_12	3,680	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	147	Super_14	465	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	147	Data Manager_09	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	148		*60	*	*60	*	*60	*	*60	*	*60	*	*60	*	*60	*	*60	*	*60	*	*60
CR	148	Chief, Cultural Res_12	2,760	86	2,846	88	2,934	91	3,025	94	3,118	97	3,215	100	3,315	103	3,418	106	3,524	109	3,633
CR	149		*20	*	*20	*	*20	*	*20	*	*20	*	*20	*	*20	*	*20	*	*20	*	*20
CR	149	Chief, Cultural Res_12	460	14	474	15	489	15	504	16	520	16	536	17	552	17	570	18	587	18	605
CR	149	Int Ranger_09	330	10	340	11	351	11	362	11	373	12	384	12	396	12	409	13	421	13	434
CR	150		*56	*	*56	*	*56	*	*56	*	*	*	*	*	*	*	*56		*56		*56
CR	150	Chief, Biological Res_12	718	22	740	23	763	24	787	0	0	0	0	0	0	0	889	28	917	28	945
CR	150	Chief, Cultural Res_12	736	23	759	24	782	24	807	0	0	0	0	0	0	0	911	28	939	29	968
CR	150	FMO_12	679	21	700	22	722	22	744	0	0	0	0	0	0	0	841	26	867	27	894
CR	150	Super_14	465	14	480	15	495	15	510	0	0	0	0	0	0	0	576	18	594	18	612

RES. TYPE	ACTIVITY #	GS Rate	2009	COL	2010	COL	2011	COL	2012	COL	2013	COL	2014	COL	2015	COL	2016	COL	2017	COL	2018
CR	151		*280	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	151	Chief, Biological Res_12	2,693	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	151	Chief, Geologic Res_12	2,956	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	151	Chief, L.E_12	1,719	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	151	Chief, Maintenance_12	2,610	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	151	Super_14	3,491	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	152		*	*	*182	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	152	Chief, Biological Res_12	0	0	925	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	152	Int Ranger_09	0	0	2,722	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	152	Int Ranger_09	0	0	2,722	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	152	Super_14	0	0	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	153		*	*	*72	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	153	Int Ranger_09	0	0	817	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	153	Data Manager_09	0	0	929	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	153	Chief, Cultural Res_12	0	0	759	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	153	Super_14	0	0	480	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	154		*	*	*560	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	154	Chief, Cultural Res_12	0	0	1,897	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	154	Proj Inv_12	0	0	*24662	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	155				*560	*	*	*	*	*	*560	*	*	*	*	*	*	*	*	*	*
CR	155	Chief, Cultural Res_12	*	*	1,897	0	0	0	0	0	1,897	0	0	0	0	0	0	0	0	0	0
CR	155	Proj Inv_12	0	0	*24662	0	0	0	0	0	*24662	0	0	0	0	0	0	0	0	0	0
CR	156		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR	156	Chief, Biological Res_12	718	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	156	Chief, Geologic Res_12	788	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	156	Super_14	931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CR	157	COVERED UNDER 154																			
CR	158		*	*	56	*	*	*	*	*	*	*	56	*	*	*	*	*	*	*	56
CR	158	Chief, Biological Res_12	0	0	740	0	0	0	0	0	0	0	836	0	0	0	0	0	0	0	945
CR	158	Chief, Cultural Res_12	0	0	759	0	0	0	0	0	0	0	858	0	0	0	0	0	0	0	969
CR	158	Chief, Geologic Res_12	0	0	813	0	0	0	0	0	0	0	919	0	0	0	0	0	0	0	1,038
CR	158	Super_14	0	0	480	0	0	0	0	0	0	0	542	0	0	0	0	0	0	0	612
CR	159		*8	*	*8	*	*8	*	*8	*	*8	*	*8	*	*8	*	*8	*	*8	*	*8
CR	159	Super_14	465	14	480	15	495	15	510	16	526	16	542	17	559	17	576	18	594	18	613
MCA	160		*80	*	*80	*	*80	*	*80	*	*80	*	*80	*	*80	*	*80	*	*80	*	80
MCA	160	SCC FUNDING	0	0	0	0	0	0	0	0	*30000	0	0	0	0	0	0	0	0	0	0
MCA	160	Data Manager_09	3,005	93	3,098	96	3,194	99	3,293	102	3,395	105	3,500	109	3,609	112	3,721	115	3,836	119	3,955
MCA	161		*32	*	*32	*	*32	*	*32	*	*32	*	*32	*	*32	*	*32	*	*32	*	*32
MCA	161	Chief, Cultural Res_12	1,472	46	1,518	47	1,565	49	1,613	50	1,663	52	1,715	53	1,768	55	1,823	57	1,879	58	1,937
MCA	161	Data Manager_09	1,202	37	1,239	38	1,278	40	1,317	41	1,358	42	1,400	43	1,444	45	1,488	46	1,534	48	1,582
MCA	162		*48	*	*48	*	*32	*	*32	*	*	*	*	*	*	*	*	*	*	*	*
MCA	162	Chief, Cultural Res_12	736	23	759	24	782	24	807	0	0	0	0	0	0	0	0	0	0	0	0
MCA	162	Super_14	931	29	960	30	989	31	1,020	0	0	0	0	0	0	0	0	0	0	0	0
MCA	162	Chief, Geologic Res_12	394	12	406	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCA	162	Chief, Biological Res_12	359	11	370	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

RES. TYPE	ACTIVITY #	GS Rate	2009	COL	2010	COL	2011	COL	2012	COL	2013	COL	2014	COL	2015	COL	2016	COL	2017	COL	2018
MCA	163		36	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MCA	163	Chief, Cultural Res_12	736	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCA	163	Super_14	233	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCA	163	Chief, Geologic Res_12	197	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCA	163	Data Manager_09	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCA	163	Chief, Biological Res_12	180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCA	164		*24	*	*24	*	*24	*	*24	*	*24	*	*24	*	*24	*	*24	*	*24	*	*24
MCA	164	Chief, Cultural Res_12	736	23	759	24	782	24	807	25	832	26	857	27	884	27	911	28	940	29	969
MCA	164	Data Manager_09	300	9	310	10	319	10	329	10	340	11	350	11	361	11	372	12	384	12	395
MCA	165		*24	*	*24	*	24		24		24		24		24		24		24		24
MCA	165	Chief, Cultural Res_12		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCA	165	Data Manager_09		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCA	166		40	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MCA	166	Chief, Cultural Res_12	1,472	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCA	166	Data Manager_09	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCA	166a	Chief, Cultural Res_12	0	0	3,029	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCA	166a	Proj Inv_12	0	0	1,514	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCA	167		*	*	*50	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MCA	167	Chief, Cultural Res_12	0	0	1,897	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCA	167	Chief, Biological Res_12	0	0	185	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCA	167	Chief, Geologic Res_12	0	0	203	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCA	167	Super_14	0	0	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCA	167	Chief, Cultural Res_12																			
MCA	168		*	*	*	*	80	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MCA	168	Proj Inv_12	0	0	0	0	2,934	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCA	168	Chief, Cultural Res_12	0	0	0	0	978	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OPN	169		*	*	*330	*	*330	*	*	*	*	*	*	*	*	*	*	*	*	*	*
OPN	169	Data Manager_09	2,254	0	3,756	116	3,872	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OPN	169	Super_14	815	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OPN	169	Chief, Geologic Res_12	24,635	0	4,927	153	5,080	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OPN	169	Biologists_9	3,250	0	100	3	103	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OPN	169	Chief, Biological Res_12	2,693	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OPN	170		*1664	*	*1664	*	*1664	*	*1664	*	*1664	*	1,664		1,664		1,664		1,664		1,664
OPN	170	Data Manager_09	1,664	52	1,716	53	1,769	55	1,824	57	1,880	58	1,938	60	1,999	62	2,060	64	2,124	66	2,190
OPN	171		*104	*	*104	*	*104	*	*104	*	*104	*	*104	*	*104	*	*104	*	*104	*	*104
OPN	171	Data Manager_09	3,906	121	4,027	125	4,152	129	4,281	133	4,414	137	4,550	141	4,691	145	4,837	150	4,987	155	5,141
OPN	172		*400	*	*200	*	*200	*	*200	*	*400	*	*	*	*	*	*	*	*	*	*
OPN	172	S. Bio-Tech_7	2,880	89	1,440	45	1,485	46	1,531	47	3,156	0	0	0	0	0	0	0	0	0	0
OPN	172	Chief, Geologic Res_12	3,942	122	1,971	61	2,032	63	2,095	65	4,320	0	0	0	0	0	0	0	0	0	0
OPN	172	Data Manager_09	6,010	186	3,005	93	3,098	96	3,194	99	6,586	0	0	0	0	0	0	0	0	0	0
OPN	173		*	*	*400	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
OPN	173	S. Bio-Tech_7	0	0	2,969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OPN	173	Chief, Geologic Res_12	0	0	2,032	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OPN	173	Data Manager_09	0	0	6,196	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OPN	173	Chief, Biological Res_12	0	0	1,851	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OPN		Chief, Biological Res_12	0	0	1,851	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OPN	174		*	*	*60	*	*60	*	*60	*	*60	*	*60	*	*60	*	*60	*	*60	*	60
OPN	174	Int Ranger_09	0	0	2,041	63	2,104	65	2,170	67	2,237	69	2,306	71	2,378	74	2,451	76	2,527	78	2,606

RES. TYPE	ACTIVITY #	GS Rate	2009	COL	2010	COL	2011	COL	2012	COL	2013	COL	2014	COL	2015	COL	2016	COL	2017	COL	2018
OPN	175		*88	*	*88	*	*	*	*40	*	*	*	*40	*	*	*	*40	*	*	*	*40
OPN	175	Chief, Geologic Res_12	1,971	61	2,032	0	0	0	1,080	0	0	0	1,148	0	0	0	0	0	0	0	0
OPN	175	Chief, Cultural Res_12	1,840	57	1,897	0	0	0	1,080	0	0	0	1,148	0	0	0	0	0	0	0	0
OPN	175	Super_14	465	14	480	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OPN	176		*24	*	*24	*	*24	*	*24	*	*24	*	*24		*24	*	*24	*	*24	*	*24
OPN	176	Chief, Biological Res_12	1,077	33	1,111	34	1,145	35	1,180	37	1,217	38	1,255	39	1,294	40	1,334	41	1,375	43	1,418
OPN	177		*	*	*	*	*	*	*	*	*96	*	*	*	*	*	*	*	*	*	*
OPN	177	Chief, Geologic Res_12	0	0	0	0	0	0	0	0	1,336	0	0	0	0	0	0	0	0	0	0
OPN	177	Chief, Biological Res_12	0	0	0	0	0	0	0	0	1,217	0	0	0	0	0	0	0	0	0	0
OPN	177	Super_14	0	0	0	0	0	0	0	0	1,578	0	0	0	0	0	0	0	0	0	0
OPN	177	Biologists_9	0	0	0	0	0	0	0	0	881	0	0	0	0	0	0	0	0	0	0
OPN	178		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
OPN	178	Chief, Biological Res_12	734	23	757	23	780	24	804	25	829	26	855	27	882	27	909	28	937	29	966
OPN	178	Biologists_9	2,026	63	2,089	65	2,154	67	2,220	69	2,289	71	2,360	73	2,433	75	2,509	78	2,586	80	2,667
OPN	178	Data Manager 9	2,026	63	2,089	65	2,154	67	2,220	69	2,289	71	2,360	73	2,433	75	2,509	78	2,586	80	2,667
OPN	179		*400	*	400		400		400		400		400		400		400		400		400
OPN	179	Chief, Cultural Res_12	3,680	114	3,794	118	3,912	121	4,033	125	4,158	129	4,287	133	4,420	137	4,557	141	4,698	146	4,844
OPN	179	Chief, L.E_12	3,438	107	3,544	110	3,654	113	3,767	117	3,884	120	4,005	124	4,129	128	4,257	132	4,389	136	4,525
OPN	179	Chief, Geologic Res_12	3,942	122	4,064	126	4,190	130	4,320	134	4,454	138	4,592	142	4,734	147	4,881	151	5,032	156	5,188
OPN	179	Super_14	4,654	144	4,799	149	4,947	153	5,101	158	5,259	163	5,422	168	5,590	173	5,763	179	5,942	184	6,126
OPN	179	Chief, Maintenance_12	3,480	108	3,588	111	3,699	115	3,814	118	3,932	122	4,054	126	4,180	130	4,309	134	4,443	138	4,580
OPN	180		*160	*	*160	*	*160	*	*160	*	*160	*	*160	*	*160	*	*160	*	*160	*	*160
OPN	180	Chief, L.E_12	3,438	107	3,544	110	3,654	113	3,767	117	3,884	120	4,005	124	4,129	128	4,257	132	4,389	136	4,525
OPN	180	Chief, Biological Res_12	3,590	111	3,702	115	3,816	118	3,935	122	4,057	126	4,183	130	4,312	134	4,446	138	4,584	142	4,726
OPN	181		*160	*	*160	*	*160	*	*160	*	*160	*	*160	*	*160	*	*160	*	*160	*	*160
OPN	181	Chief, Biological Res_12	3,590	111	3,702	115	3,816	118	3,935	122	4,057	126	4,183	130	4,312	134	4,446	138	4,584	142	4,726
OPN	181	Chief, Geologic Res_12	3,942	122	4,064	126	4,190	130	4,320	134	4,454	138	4,592	142	4,734	147	4,881	151	5,032	156	5,188
OPN	182		*400	*	*400	*	*400	*	*400	*	*400	*	*400	*	*400	*	*400	*	*400	*	*400
OPN	182	Chief, Cultural Res_12	3,680	114	3,794	118	3,912	121	4,033	125	4,158	129	4,287	133	4,420	137	4,557	141	4,698	146	4,844
OPN	182	Chief, L.E_12	3,438	107	3,544	110	3,654	113	3,767	117	3,884	120	4,005	124	4,129	128	4,257	132	4,389	136	4,525
OPN	182	Chief, Geologic Res_12	3,942	122	4,064	126	4,190	130	4,320	134	4,454	138	4,592	142	4,734	147	4,881	151	5,032	156	5,188
OPN	182	Super_14	4,654	144	4,799	149	4,947	153	5,101	158	5,259	163	5,422	168	5,590	173	5,763	179	5,942	184	6,126
OPN	182	Chief, Maintenance_12	3,480	108	3,588	111	3,699	115	3,814	118	3,932	122	4,054	126	4,180	130	4,309	134	4,443	138	4,580
Hydrol	183	Included in budget for activity #73	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	184	Included in budget for activity #73	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	185	Included in budget for activity #73	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	186		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	186	Chief, Geologic Res_12	0	0	1,514	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrol	186	Super_14	0	0	851	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrol	186	Proj_Inves_12	0	0	3,029	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrol	186	Data Manager 9	0	0	418	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	187		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
NCDB	187	Super_14	0	0	0	0	0	0	0	0	0	0	0	0	1,469	0	0	0	0	0	0
NCDB	187	Chief, Biological Res_12	0	0	0	0	0	0	0	0	0	0	0	0	2,090	0	0	0	0	0	0
NCDB	187	Chief, Geologic Res_12	0	0	0	0	0	0	0	0	0	0	0	0	2,090	0	0	0	0	0	0
NCDB	187	Chief, Cultural Res_12	0	0	0	0	0	0	0	0	0	0	0	0	2,090	0	0	0	0	0	0
NCDB	187	Planner/Proj_Invest_12	0	0	0	0	0	0	0	0	0	0	0	0	4,181	0	0	0	0	0	0
NCDB	187	SMEs_12	0	0	0	0	0	0	0	0	0	0	0	0	4,181	0	0	0	0	0	0



RES. TYPE	ACTIVITY #	GS Rate	2009	COL	2010	COL	2011	COL	2012	COL	2013	COL	2014	COL	2015	COL	2016	COL	2017	COL	2018
NCDB	187	Biologist_9	0	0	0	0	0	0	0	0	0	0	0	0	1,441	0	0	0	0	0	0
NCDB	187	Phy_Sci_Tech_9	0	0	0	0	0	0	0	0	0	0	0	0	1,441	0	0	0	0	0	0
Hydrol	188		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydrol	188	Chief, Geologic Res_12	0	0	909	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrol	188	Super_14	0	0	851	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrol	188	Lands Technician_9	0	0	2,088	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrol	188	WRD_Technician_9	0	0	2,088	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	189		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
NCDB	189	SCC funding	0	0	150,000		150,000		100,000												
NCDB	189	Super_14	0	0	1,277	40	1,317	41	1,357	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	189	Chief, Biological Res_12	0	0	3,029	94	3,123	97	3,220	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	189	Biologist_9	0	0	4,177	129	4,306	134	4,440	0	2,277	71	2,348	73	2,420	75	2,495	77	2,573	80	2,653
NCDB	190		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
NCDB	190	Chief, Biological Res_12	0	0	1,514	47	1,561	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NCDB	190	Biologist_9	0	0	8,354	259	8,613	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OPN	191		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
OPN	191	Chief, Biological Res_12	0	0	909	28	937														
OPN	191	Chief_LE_12	0	0	909	28	937														
OPN	191	GL_Ranger_9	0	0	4,507	140	4,647														
OPN	192		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
OPN	192	Super_14	0	0	0	0	0	0	2,256	70	2,326	72	2,398								
OPN	192	Chief, Geologic Res_12	0	0	0	0	0	0	3,211	100	3,311	103	3,413								
OPN	192	Chief, Biological Res_12	0	0	0	0	0	0	3,211	100	3,311	103	3,413								
OPN	192	Chief, Cultural Res_12	0	0	0	0	0	0	3,211	100	3,311	103	3,413								
OPN	192	Chief_LE_12	0	0	0	0	0	0	3,211	100	3,311	103	3,413								
OPN	192	Chief_Maint_12	0	0	0	0	0	0	3,211	100	3,311	103	3,413								
OPN	192	Planner/Proj_Invest_12	0	0	0	0	0	0	19,265	597	19,862	616	20,478								
		<b>TOTALS</b>	<b>768,840</b>		<b>894,944</b>		<b>903,443</b>		<b>957,150</b>		<b>1,151,892</b>		<b>790,590</b>		<b>782,265</b>		<b>820,681</b>		<b>963,982</b>		<b>878,903</b>
		FTE averaged at the GS11/5 level	12		14		13		14		16		11		10		10		12		10



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

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