



National Park Service
U.S. Department of the Interior
Guadalupe Mountains National Park
Salt Flat, Texas

Wilderness Stewardship and Trails Plan Environmental Assessment

December 2014



Cover photo: Guadalupe Peak from Hunter Peak. NPS file image.

Wilderness Stewardship and Trails Plan

Environmental Assessment

Summary

This Wilderness Stewardship and Trails Plan identifies the core qualities of wilderness character for lands designated as wilderness or deemed eligible for wilderness study in Guadalupe Mountains National Park. It recommends actions necessary to meet the mandates of the Wilderness Act and of the 2012 Guadalupe Mountains National Park General Management Plan to provide for ecosystem restoration and preservation of the park's unique geologic, scenic, and wilderness values, while expanding opportunities for visitors to enjoy easier access to some park settings. It outlines the framework through which wilderness character will be monitored and maintained.

The park's current Backcountry and Wilderness Management Plan (1995) is outdated. Concepts of wilderness character and management have changed significantly since that time. Guidance is also needed for managing recreational, research, and administrative use of 30,000 acres of wilderness-eligible lands in the Salt Basin that will be opened to the public in 2014.

Guadalupe Mountains National Park proposes to implement a Wilderness Stewardship Plan that will guide management of 82,334 acres of designated and eligible wilderness within the park. This Environmental Assessment (EA) evaluates four alternatives: Alternative A – No Action, Alternative B – Emphasis on improving ecosystem integrity and wilderness character, Alternative C – Emphasis on visitor access and enjoyment, and Alternative D – Protect Wilderness Character and Restore Natural and Cultural Resources While Increasing the Range of Recreational Opportunities within Wilderness. The National Park Service has selected Alternative D as the Proposed Action Alternative.

This Environmental Assessment was prepared in compliance with the National Environmental Policy Act (NEPA) to provide the decision-making framework that 1) analyzes a reasonable range of alternatives to meet project objectives, 2) evaluates potential issues and impacts to the park's resources and values, and 3) identifies mitigation measures to lessen the degree or extent of these impacts. A careful analysis of the potential impacts of proposed actions under each of the four alternatives was conducted. The impact topics that were retained for analysis in this document include visitor use and experience, park operations, wilderness character, biotic resources, special status species, water quality, soil resources, archeological/ethnographic resources, and historic structures. Other impact topics were dismissed because the project would result in negligible or minor effects to those resources. No major environmental impacts are anticipated as a result of implementing the Proposed Action Alternative. Public scoping was conducted to assist with the development of this document.

Public Comment

If you wish to comment on the EA, you may post comments online at <http://parkplanning.nps.gov/gumo> or mail or hand deliver comments to: Superintendent; Guadalupe Mountains National Park, 400 Pine Canyon Drive, Salt Flat, Texas 79847. This EA will be on public review for 30 days. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. Although you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. Comments will not be accepted by fax, email, or in any other way than those specified above. Bulk comments in any format (hard copy or electronic) submitted on behalf of others will not be accepted.

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Appendix B: Baseline Assessment for Wilderness Character Monitoring (excerpted from Wilderness Core Elements Document [Mills 2010]).

Appendix C: Wilderness Eligibility Assessment from the General Management Plan (NPS 2012).

Appendix D: Summary of comments received during the public scoping period.

PURPOSE AND NEED

Introduction

This Environmental Assessment (EA) analyzes and documents the potential environmental impacts of a National Park Service (NPS) proposal to implement the Guadalupe Mountains Wilderness Stewardship and Trails Plan (WSP). This plan applies to 35,484 acres of backcountry deemed eligible for wilderness study as well as 46,850 acres of designated wilderness within the park.

Guadalupe Mountains National Park is located within Culberson and Hudspeth counties in far west Texas, approximately 110 miles east of El Paso, Texas, and 60 miles southwest of Carlsbad, New Mexico. Highway 62/180 is a major thoroughfare and scenic corridor that passes through the southeast corner of the park. The park shares its border with numerous private landowners, the Lincoln National Forest, the Carlsbad and Las Cruces districts of the Bureau of Land Management, and trust lands managed by the states of New Mexico and Texas (Figure 1).

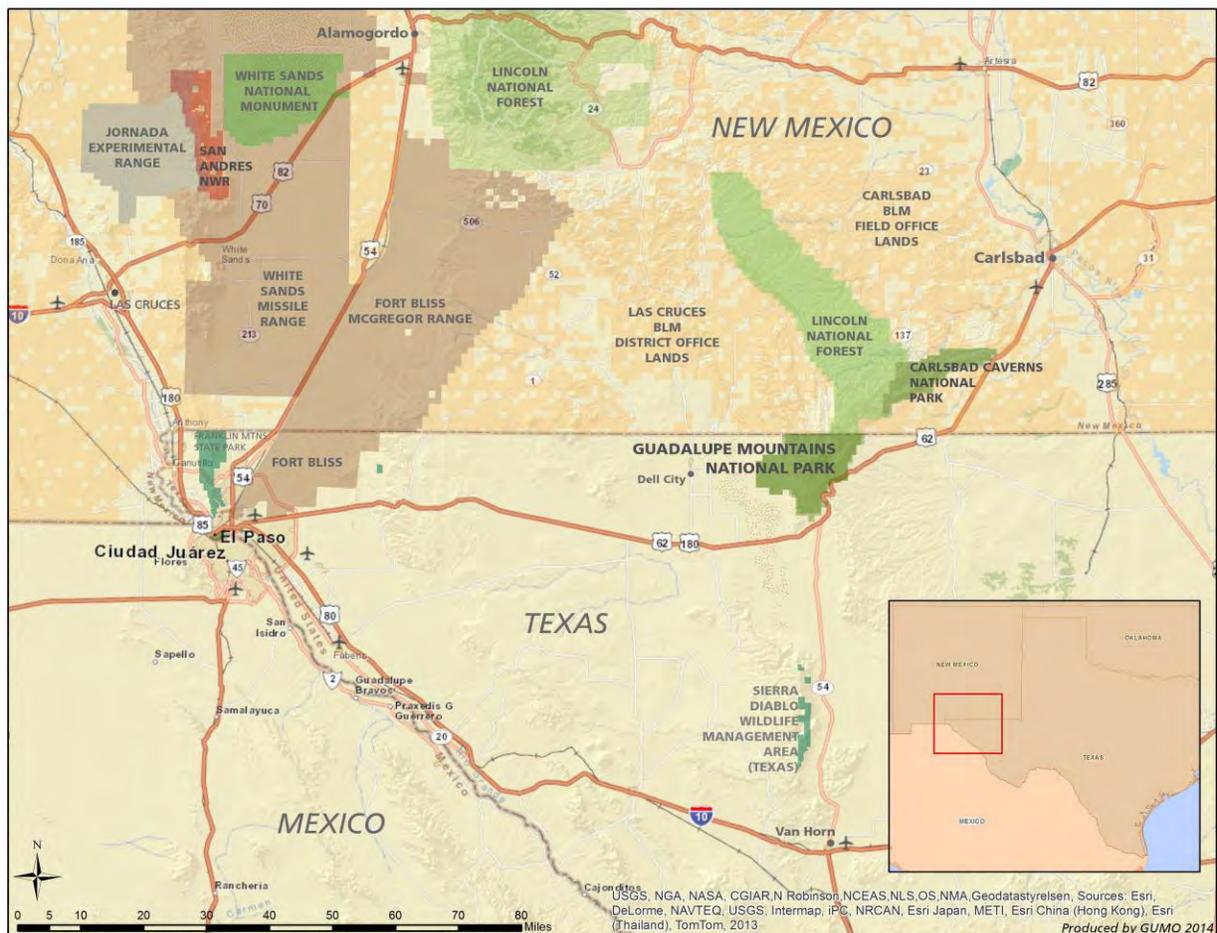


Figure 1. Location of Guadalupe Mountains National Park in relation to towns, highways, and other public lands in far west Texas and adjacent New Mexico.

Congress authorized creation of Guadalupe Mountains National Park on October 15, 1966, in order to preserve an area "...possessing outstanding geological values together with scenic and other natural values of great significance." Congress established 76,293 acres as Guadalupe Mountains National Park on September 30, 1972. On October 28, 1988, Congress authorized the addition of 10,123 acres in the Salt Basin, bringing the park to its present 86,416 acres.

In 1978, 46,850 acres of the park's high country were designated as wilderness by Congress (Appendix A). The 2012 Guadalupe Mountains National Park General Management Plan (GMP) includes an eligibility assessment that deems an additional 35,484 acres of lower elevation park backcountry as suitable for consideration for wilderness designation (Appendix C). Designated and eligible wilderness comprise 95% of the park's area (Figure 2). The lands deemed eligible for wilderness will be managed to protect their wilderness character (GMP 2012) and are therefore included in this WSP. No distinction between these areas will be made in this document; "wilderness" refers to both designated and eligible wilderness.

While the Wilderness Act of 1964 mandates preservation of "wilderness character", this term is not defined within the Act. In American culture, "wilderness" evokes a complex emotional response to a suite of biophysical, experiential and symbolic concepts that differentiate wilderness from other lands and would seem to be impossible to quantify. However, beginning in the early 2000s, an interagency team of wilderness experts developed a national framework to define, quantify, and monitor wilderness character, using four defined and one undefined qualities of wilderness character (Landres et al. 2008):

Untrammeled - Wilderness is essentially unhindered and free from modern human control or manipulation. For example, insect outbreaks are allowed to run their course.

Natural - Wilderness maintains ecological systems that are substantially free from the effects of modern civilization. For example, most or all species native to an ecosystem are present, and no or few deliberately introduced or invasive exotic species are present.

Undeveloped - Wilderness retains its primeval character and influence, and is essentially without permanent improvements or modern human occupation. For example, there are no permanent structures or mitigations such as developed water sources.

Solitude - Wilderness provides outstanding opportunities for a primitive and unconfined type of recreation. For example, visitors have an opportunity to travel off-trail or camp outside of designated campgrounds.

Special Features - This quality of wilderness character is different for each area and allows the unique character of each wilderness to be recognized and preserved. Within the Guadalupe Mountains Wilderness, this quality is represented by the unique geologic and paleontological features of the landscape.

The Guadalupe Mountains Wilderness includes both desert and montane systems. The Guadalupe Mountains rise more than 5,000 feet from the surrounding Chihuahuan Desert lowlands. El Capitan, the park's most striking feature, is a 1,000-foot-high limestone bluff visible for more than 50 miles. Nearby Guadalupe Peak, at 8,751 feet elevation, is the highest point in Texas and the park includes eight of the ten highest points in the state. The park's isolation from regional cities and towns preserves scenic vistas and exceptional opportunities for solitude, as well as rare and valuable flora and fauna. Abundant wildlife and clear springs remain relatively unhindered by human influence, and the overriding forces of nature are evident throughout the landscape. A system of trails and campgrounds provide visitors the opportunity to experience wilderness in settings ranging from Chihuahuan Desert scrubland to lush riparian woodlands and cool conifer forests. World-renowned and well-exposed geologic resources dating to the Middle Permian Period can also be found throughout the wilderness.

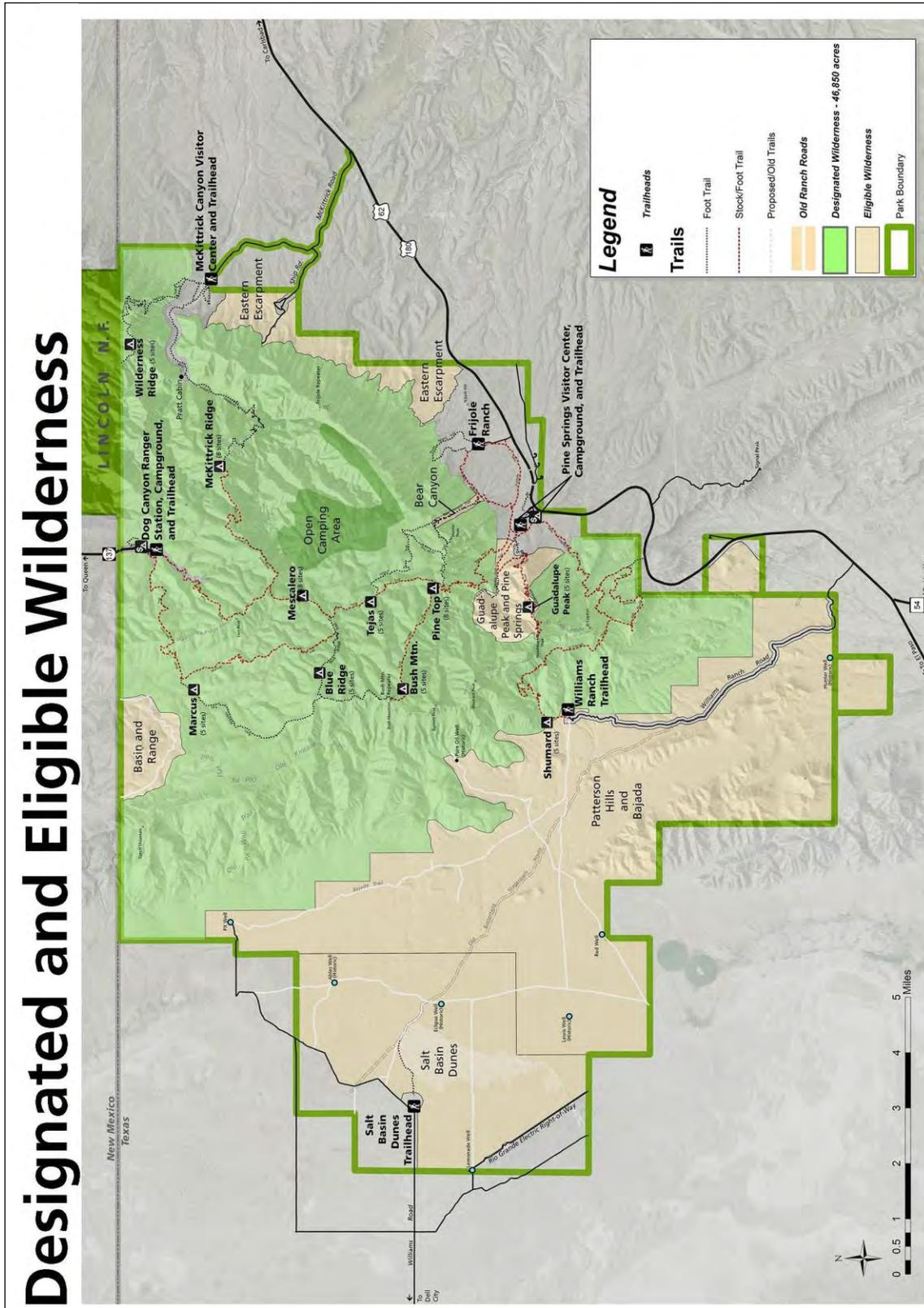


Figure 2. Guadalupe Mountains National Park Map, showing designated wilderness and eligible wilderness units.

Purpose and Need

The wilderness of Guadalupe Mountains National Park provides outstanding opportunities for discovery, challenge, and self-reliance in a rugged desert and mountain landscape. The purpose of this Wilderness Stewardship Plan is to provide a framework by which to preserve and improve the qualities of wilderness character while providing unique opportunities for visitors to experience the gift of quiet, solitude, and primitive adventure that wilderness provides. This WSP will serve as a guideline to detect, prevent and/or remedy any degradation in the qualities of wilderness character in the Guadalupe Mountains Wilderness.

Management Policies (NPS 2006) require that each park containing wilderness maintain an up-to-date and approved wilderness management plan that "...will identify desired future conditions, as well as establish indicators, standards, conditions, and thresholds beyond which management actions will be taken to reduce human impacts to wilderness resources." Guadalupe Mountains National Park's most recent backcountry/wilderness management plan (NPS 1995) needs to be updated in order to remain consistent not only with Management Policies (NPS 2006), but also to implement the direction provided in the park's General Management Plan (NPS 2012), Resource Stewardship Strategy (NPS 2009) and Wilderness Core Elements (Mills 2010).

Background

Natural History

Guadalupe Mountains National Park is situated at the western terminus of the world's most extensive Paleozoic reef. The fossils and geologic structures associated with this 265-million-year-old feature remain intact and are well-exposed in the park's rugged canyons as well as along two fault-defined escarpments. The western section of the park contains the remains of Pleistocene salt lakes and related dune systems.

The Guadalupe Mountains are a "sky island" within a Chihuahuan Desert sea where Rocky Mountain and Great Plains flora and fauna were isolated by environmental changes. The park supports populations of numerous relict and endemic montane, canyon, desert, grassland, and aquatic species in a delicate balance supported by the interaction of physical geography, latitude, climate, and hydrology.

Stark contrasts between mountains and desert, vistas stretching as far as the eye can see, brilliant fall colors created by the hidden coves of streamside maples, deep rock-ribbed canyons and sparkling white dunes contribute to the extraordinary scenic beauty of the Guadalupe Mountains. Rugged and windswept, the park's wilderness provides opportunities to experience the unaltered dynamic of life in a remote landscape resplendent in its isolated beauty and inspirational solitude.

Cultural History

The Guadalupe Mountains have a human history that extends at least 10,000 years before the present. This history includes native peoples and successive waves of explorers, settlers, soldiers, and immigrants. Burned rock middens built by generations of prehistoric hunter-gatherers and water tanks and windmills from 19th and 20th century ranching operations are the most visible evidence of human occupation.

History of Wilderness Planning and Management

The process of designating wilderness within Guadalupe Mountains National Park began before the park even opened. Wilderness suitability studies and public hearings took place between 1966 and 1971 (Fabry 1988). The result was Wilderness Recommendation: Guadalupe Mountains National

Park (NPS 1972). This document recommended designating 46,850 acres within the park as wilderness. Congress acted on this recommendation without modification in 1978 under Title IV of the National Parks and Recreation Act (Appendix A).

The first Backcountry Management Plan for the park was part of a larger Resource Management Plan (NPS 1975); its objective was to “provide for maximum visitor enjoyment of... wilderness” as long as the types and amounts of visitor use were compatible with park natural areas and did not incur irreparable damage to park resources. No reference was made to the mandates of the 1964 Wilderness Act and monitoring was limited to impacts immediately adjacent to trails and camping areas. Management projects outlined in the plan included increasing carrying capacity by improving trails and formalizing campsites. At this time, the backcountry included 60 miles of trails developed from old roads and stock trails. Eighty percent of the trail system was open to horse use. This plan also suggested removing from the backcountry most of the man-made structures left over from ranching operations.

The backcountry management plan was substantially revised a decade later (NPS 1984), primarily to accommodate requirements of the 1964 Wilderness Act in the park’s now-designated wilderness. The primary emphasis of this plan was protecting wilderness values, with visitor experience taking second place. Restoration of natural processes and disturbed lands were among the goals, as was designating additional campsites to protect soils and vegetation. Toilet facilities in McKittrick Canyon were to be maintained. Almost 30 miles of trails would be re-routed or deleted from the system; pack stock would be limited to 42 miles of the system, and it was at this time that a day-use-only restriction on pack stock use was implemented. New administrative facilities in wilderness included a radio repeater on Bush Mountain and a patrol cabin near Pinetop. Although some remnants of the historic backcountry stock watering system were to be retained as “discovery” sites, others, such as earthen tanks, were to be removed and restored.

The park’s wilderness management plan was last updated twenty years ago (NPS 1995), driven by the need to define management for 10,123 acres added to the park in 1988. This plan contained no significant changes in policy from the 1984 plan. Instead, it focused on updating facilities (mostly trails and campgrounds) in order to handle projected increases in use, as well as prescribing use limits for campers and pack stock. Pit toilets were to be installed at popular campgrounds. The plan stipulated using the results of comprehensive monitoring of visitor impacts to facilities and resources to guide future management decisions. For the first time, camping on the west side of the park below the escarpment (in the Salt Basin) was considered. Historic features were to be evaluated and non-significant features were to be removed from backcountry and wilderness.

Since 1995, the NPS has completed a suite of new foundation documents to guide management of Guadalupe Mountains National Park: General Management Plan (NPS 2012), Natural Resource Condition Assessment (Kilkus et al. 2013), Wilderness Core Elements (Mills 2010), Resource Stewardship Strategy (NPS 2009), and Fire Management Plan (NPS 2005, revised 2012). The 1995 Backcountry/Wilderness Management Plan requires an update in order to remain congruent with these recent documents and to reflect modern concepts of wilderness stewardship and monitoring (Landres et al. 2008, NPSWCIT 2014).

For example, the General Management Plan (NPS 2012) includes a determination that six parcels of the park’s non-wilderness backcountry are eligible for wilderness study (Table 1, Figure 2). Of these parcels, the Salt Basin Dunes were added to the park in 1988. The other five parcels were left out of the original Wilderness Recommendation (NPS 1972) for reasons that are no longer valid. None of these lands were considered in the 1995 Backcountry and Wilderness Management Plan; a new plan is needed to ensure they are managed to preserve their wilderness character. Whether or not these parcels are added to the park’s designated wilderness will be determined by a separate planning and public input process, and must be approved by an act of Congress.

Table 1. Lands deemed eligible for study as potential additions to the Guadalupe Mountains Wilderness (NPS 2012). Individual units are mapped in Figure 2.

Eligible Wilderness Unit	Size (acres)
Salt Basin Dunes	9,126
Patterson Hills and Bajadas	22,776
Guadalupe Peak and Pine Springs Canyon	960
Bear Canyon	83
Eastern Escarpment	1,550
Basin and Range	989
Total Area Eligible for Wilderness Study	35,484

Like the previous Backcountry Wilderness Management Plan (1995), the proposed Wilderness Stewardship and Trails plan includes new projects and policies designed to meet wilderness goals and objectives, but unlike the park's older backcountry management plans, this plan views all actions within a framework of monitoring and preserving the qualities of wilderness character (Untrammled, Natural, Undeveloped, and Solitude/Unconfined Recreation.) While some specific actions are recommended in the various alternatives, this wilderness stewardship plan is built around the idea of using wilderness character monitoring to guide adaptive management.

Relationship to Other Plans and Policies

This section provides a summary of administrative factors (laws, policies, and plans) that directly apply to the wilderness resource. These provide the foundation for developing the stewardship actions proposed in this plan.

Enabling Legislation

Congress authorized the creation of Guadalupe Mountains National Park (Public Law 89-667) in 1966 in order to preserve an area "...possessing outstanding geological values together with scenic and other natural values of great significance." In 1972, Congress formally established 76,293 acres as Guadalupe Mountains National Park. In 1988, Congress passed Public Law 100-541, 102 Stat. 2720 enlarging the park to its present 86,416 acres. In 1978, 46,850 acres of the park's backcountry were designated by Congress as wilderness (Appendix A).

Federal Statutes Affecting Wilderness Stewardship

The following are legislative acts that have a direct effect on the wilderness resource:

The *NPS Organic Act* of 1916 (P.L. 64-235) directs the NPS to manage the parks "to conserve the scenery and the natural and historic objects and wild life therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations"

The *Wilderness Act* of 1964 (P.L. 88-577) provides criteria for determining suitability for wilderness designation and establishes restrictions on activities that can be undertaken within a designated wilderness area.

The *National Environmental Policy Act* (NEPA) of 1969 (42 United States Code (USC) 4321 et seq.) requires an environmental analysis for many federal actions having the potential to impact the quality of the human environment.

The *Endangered Species Act* of 1973 (19 U.S.C. 1536 (c), 50 CFR 402) requires that the effects of any agency action that may affect endangered, threatened, or candidate species must be evaluated in consultation with either the USFWS or NMFS, as appropriate.

The *National Historic Preservation Act* (NHPA) of 1966 (Public Law 102-575) provides the framework for review and protection of cultural resources, and ensures that they are considered during federal project planning and implementation.

The *Clean Air Act* (CAA) of 1970 stipulates that Federal agencies have a responsibility to protect the park's air quality from adverse air pollution impacts. GUMO wilderness is designated as a Class 1 air shed, which is afforded extra protection against pollution by the CAA.

The *Clean Water Act* (CWA) of 1972 sets requirements to establish water quality standards for all contaminants in surface waters.

NPS Policies Affecting Wilderness Stewardship

Management Policies (NPS 2006) state that "Where designated wilderness exists, park managers have a responsibility to develop and maintain a wilderness management plan or equivalent planning document to guide the preservation, management, and use of these resources." Director's Order #41: Wilderness Preservation and Management (NPS 2013) supplements the Management Policies (NPS 2006) with detailed planning guidance.

Park Policies and Plans Affecting Wilderness Stewardship

The Wilderness Stewardship Plan at Guadalupe Mountains National Park does not stand alone, but coordinates with or implements direction provided in a range of park-specific policy and planning documents:

General Management Plan (NPS 2012). The GMP emphasizes ecosystem restoration and preservation of the park's unique geologic, scenic, and wilderness values, while at the same time increasing the range of experiences available to the public and providing a broad suite of educational and research opportunities. The GMP sets desired conditions for a range of resources, including wilderness. Appendix D of the GMP is an eligibility assessment for 35,484 acres of backcountry to be considered for addition to the designated wilderness. The GMP also calls for providing additional trail access and campsites in designated wilderness and backcountry areas.

Natural Resource Condition Assessment (Kilkus et al. 2013). The NRCA provides an assessment of the current condition and trend of the park's major natural resources. Most of these resources exist mostly or entirely in wilderness.

Resource Stewardship Strategy (NPS 2009). The RSS includes strategies for managing natural and cultural resources. It defines wilderness as a fundamental park resource. The RSS defines desired conditions, indicators, and measures for park natural and cultural resources, but not for wilderness.

Wilderness Core Elements (Mills 2010). This document does for the wilderness resources what the RSS does for natural and cultural resources. It sets desired conditions, indicators, and measures for the five qualities of wilderness character (Appendix B).

Long-Range Interpretive Plan (NPS 2007). This plan includes wilderness as a primary interpretive theme and identifies the opportunities of increasing visitors' understanding and appreciation of the Guadalupe Mountains Wilderness.

Fire Management Plan (NPS 2005, amended 2012). The FMP provides specific guidance on how fire is to be managed in wilderness, and emphasizes minimizing impacts to wilderness during fire activities. Policies defined in the FMP state that suppression in wilderness will be consistent with the "minimum requirement" concept. Goals and objectives of the FMO include employing minimum impact suppression tactics, particularly in wilderness or other sensitive areas. The use of helicopters to transport personnel and materials during active fire management is permitted; chainsaws are not allowed.

Emergency Response Plan (NPS 2014). This plan does not discuss wilderness *per se*. It authorizes a range of techniques to be used during medical emergencies in the backcountry, including mule, wheeled litter, and helicopter.

Other Factors Affecting Park Wilderness

The viewshed, night sky, and soundscape within wilderness are affected by human activities occurring outside of wilderness. The lights of El Paso, Texas, and Carlsbad, New Mexico can be seen from various locations within wilderness at night. The air space above the wilderness is not restricted and airplanes can frequently be seen and heard. In addition, US Highway 62/180 is visible and traffic can be heard from many locations within the wilderness. Oil and gas development is expanding rapidly in the region; not only are lights and flares of pumping operations visible, but air quality is likely to suffer because of SO₂ and NO₂ emissions and dust from roads and drill pads.

Other Legal Uses Within Park Wilderness

There are no inholdings, mining claims, or grazing permits within Guadalupe Mountains National Park wilderness. Since 1955, Rio Grande Electric Cooperative has held a right-of-way easement to approximately 70,000 acres of the park (nearly all of the original park area). The only areas developed under this right-of-way are outside of wilderness: along the US Highway 62/180 corridor and corridors leading to developed areas within the park.

Other Jurisdictional Influences

Guadalupe Mountains National Park has concurrent jurisdiction with the State of Texas and with Hudspeth and Culberson counties, but the park's jurisdiction is primary. An MOU with Eddy County, NM covers assistance with search-and-rescue, fire, and emergency medical services. A MOU with Texas Department of Public Safety also covers search-and-rescue functions, as does a MOU with the Lincoln National Forest.

Native American Rights

Guadalupe Mountains National Park is rich in evidence of Native American uses dating back thousands of years. Fifteen tribes are affiliated with the park, having used parts of what is now park land seasonally for food gathering and processing, ceremonies, and burials. The following laws secure tribal rights to traditional uses within the park; however, Native American activities in wilderness must correspond with the intent of The Wilderness Act.

The *Native American Graves Protection and Repatriation Act* (Public Law 101-601; 25 USC 3001 et seq.). NAGPRA provides a systematic process for determining the rights of lineal descendants, Indian tribes and Native Hawaiian organizations to certain Native American human remains, funerary objects, sacred objects and objects of cultural patrimony with which they are affiliated, and for the disposition of discoveries on Federal and tribal land.

The *American Indian Religious Freedom Act* of 1978 requires the United States to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites.

The *Archeological Resource Protection Act* (ARPA) of 1979 secures, for the present and future benefit of the American people, the protection of archeological resources and sites which are on public lands and Indian lands.

Accessibility

Management Policies (NPS 2006, Chapter 6.4.10) state that the National Park Service has legal obligations to make available equal opportunities for people with disabilities in all programs and activities. This requirement includes the opportunity to participate in wilderness experiences. Management responses to requests for special consideration to provide wilderness use by persons with disabilities must be in accord with the Architectural Barriers Act of 1968, the Rehabilitation Act of 1973 (as amended in 1978), and section 507(c) of the Americans with Disabilities Act of 1990 (42 USC 12207(c)). Such decisions should balance the intent of access and wilderness laws and find a way of providing the highest level of protection to the wilderness resource.

Goals and Objectives

The following goals and objectives provide a framework for the Wilderness Stewardship and Trails Plan and establish direction for park staff in developing and implementing the WSP. These goals and objectives apply to each of the proposed alternatives and will be used to measure the success of the WSP.

Goal: To establish a comprehensive plan that provides for the protection of the park's wilderness character in keeping with the requirements of the Wilderness Act.

Objective: Protect the park's wilderness resources and manage them to preserve or improve their natural conditions (Natural Quality of Wilderness).

Objective: Wilderness appears to have been affected primarily by the forces of nature; the imprint of modern humans is substantially unnoticeable (Undeveloped / Untrammelled qualities of Wilderness).

Objective: Provide outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Objective: Protect the outstanding and unique geological and paleontological resources found within wilderness.

Goal: To maintain the minimum amount of infrastructure in wilderness necessary to employee and visitor safety and resource protection.

Objective: Maintain a minimum number of administrative sites for shelter, water caches, and communications.

Objective: Install sustainable toilets where monitoring (e.g., water quality, sanitation violations) indicate a need.

Goal: To increase the range of appropriate recreational opportunities in wilderness.

Objective: Size, location, and arrangement of campgrounds are within carrying capacity of the local environment and reflect actual use.

Objective: Develop new routes and trails for a range of abilities.

Goal: To ensure that overnight camping and stock use are consistent with resource protection while providing access to remote areas within wilderness.

Objective: Allow overnight stock use where resource resilience allows.

Goal: To establish a wilderness character monitoring program to track trends in the qualities of wilderness character and determine when changes in use or management of wilderness are needed.

Objective: Implement monitoring based on the standards, indicators, and measures contained in Wilderness Core Elements (Mills, 2010).

Goal: To improve the naturalness of wilderness character by restoring native species and ecosystems.

Objective: Seek to reduce or eliminate exotic species of plants and animals from wilderness.

Objective: Restore Chihuahuan Desert grasslands in the Salt Basin and resilient forest structure in the high country.

Goal: To maintain historic structures and sites in wilderness that are significant contributors to our understanding of the history of Euro-American settlement and ranching.

Objective: Conduct surveys of historic sites and structures in wilderness to determine eligibility for the National Register of Historic Places.

Objective: Stabilize and protect sites and structures that are determined eligible for the National Register.

Objective: Remove and rehabilitate sites and structures that are not eligible for the National Register.

Goal: To increase the degree to which wilderness users understand and appreciate the unique qualities of the Guadalupe Mountains Wilderness.

Objective: Develop interpretive and educational media, programs, and activities in multiple formats to increase visitors' understanding and appreciation of the Guadalupe Mountains Wilderness, and to introduce Leave-No-Trace principles.

Scoping

Scoping is a process to identify the resources that may be affected by a project proposal, and to explore possible alternative ways of achieving the proposal while minimizing adverse impacts. Guadalupe Mountains National Park conducted internal scoping with appropriate National Park Service staff, as described in more detail in the Consultation and Coordination chapter. The monument also conducted external scoping with the public and interested/affected groups and Native American consultation.

External scoping was conducted to advise the public that the park was developing a Wilderness Stewardship and Trails Plan and to generate input on the preliminary draft alternatives created during internal scoping. The park held four widely advertised public meetings in March, 2014 in El Paso, Dell City, and Van Horn, Texas, and in Carlsbad, NM. A scoping letter dated March 9, 2014

was mailed to various federal and state agencies, fifteen affiliated Native American tribes, local governments, and local news organizations. The preliminary alternatives were published on the NPS Planning, Environmental and Public Comment (PEPC) website (<http://parkplanning.nps.gov/>) and the public was given 30 days to comment.

Internal scoping was conducted by an interdisciplinary team of professionals from Guadalupe Mountains National Park. Between February 2012 and April 2014, the team met periodically to discuss wilderness character monitoring indicators and thresholds, determine the impact topics that needed to be covered by the Wilderness Stewardship Plan, and develop concepts for the alternatives, bringing in subject matter experts as needed. The team also gathered background information on visitor use patterns and facility (campground and trail) condition.

During the external scoping period, the park received 22 written responses. Appendix D contains a summary of comments received during the public scoping period. The four public meetings attracted a total of 14 attendees; verbal comments and suggestions provided at these meetings were added to those received in written form. Several suggestions received from the public were incorporated into the proposed action alternative. These included preserving as much significant historic ranching infrastructure as possible and a new trail along the base of the eastern escarpment connecting the Pine Springs area with McKittrick Contact Station.

Comments received from tribes generally deferred to the Tigua of Isleta del Sur Pueblo and to the Mescalero Apache. Comments from the latter two tribes related to ensuring that sensitive cultural areas are avoided by new trails and campsites and allowing tribal members continued access to the park to collect herbs and mineral pigments. More information regarding external scoping and Native American consultation can be found in Comments and Coordination.

Impact Topics Retained For Further Analysis

Impact topics are derived from issues raised during internal scoping. Not every conceivable impact of a proposed action is substantive enough to warrant analysis. The following topics merit consideration in this environmental assessment for the reasons explained below.

Visitor Use and Experience

The 1916 Organic Act directs the Service to provide for public enjoyment of the scenery, wildlife and natural and historic resources of national parks "in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations." Many actions proposed in this wilderness stewardship plan could affect patterns of visitor use and the type and quality of visitor experiences. Specific elements of the visitor experience potentially affected by the WSP include access, activities and destinations, orientation and interpretation, recreation, and visitor services such as camping and facilities. Therefore, the potential impacts of the proposed Wilderness Stewardship Plan on visitor use and experience are addressed in this analysis.

Park Operations

The alternatives proposed in this plan could affect NPS operations and facilities in Guadalupe Mountains National Park, particularly resource protection, management, and interpretation operations, facilities, and operational efficiency. For this reason, impacts to NPS operations and facilities are analyzed in this document.

Wilderness Character

The topic of wilderness management in Management Policies (NPS 2006) is based on provisions of the 1916 NPS Organic Act, the 1964 Wilderness Act, and legislation establishing individual units of

the National Park System. The public purpose of wilderness in national parks includes the preservation of wilderness character and wilderness resources in an unimpaired condition, as well as for the purposes of recreational, scenic, scientific, education, conservation, and historical use. Because the alternatives will affect the qualities of wilderness character in different ways, this impact topic is retained for analysis.

Biotic Resources

The National Environmental Policy Act (1969) requires federal agencies to use all practicable means to restore and enhance the quality of the human environment. Agency goals for the management of biological resources in all units of the national park system (e.g., Management Policies (NPS 2006)) include

- Preserve and restore the natural abundance, diversity, dynamics, distribution, and habitats of native plant and animal populations and the communities and ecosystems in which they occur.
- Restore native plant and animal populations when they have been extirpated by human-caused actions.
- Minimize human impacts on native plant and animal populations, communities, and ecosystems, and the processes that sustain them.

The Guadalupe Mountains Wilderness supports a diversity of native plants, animals and ecological communities which could be affected in different ways by actions proposed under this WSP. The topic of biotic resources was therefore retained for analysis.

Special Status Species

The Federal Endangered Species Act prohibits harm to any species of fauna or flora listed by the US Fish and Wildlife Service (USFWS) as being either threatened or endangered. Such harm includes not only direct injury or mortality, but also disrupting the habitat on which these species depend.

Mexican spotted owl (*Strix occidentalis lucida*), listed as Threatened under the federal Endangered Species Act, is known to nest within the Guadalupe Mountains Wilderness. Yellow billed cuckoo (*Coccyzus americanus occidentalis*), and Guadalupe fescue (*Festuca ligulata*), both candidates for federal listing, have been observed within wilderness-eligible parts of the park. More than forty species of concern to either Texas or New Mexico are known to occur within designated and eligible wilderness. Because of the potential for some of the alternatives to affect these species, this topic was retained for analysis.

Abiotic Resources (Water Quality, Soil)

Management Policies (NPS 2006) requires protection of abiotic resources. These policies are consistent with the Federal 1972 Clean Water Act and the Federal 1970 Clean Air Act. Some of the actions proposed in this document may have an impact on soil and water resources in particular. Therefore, impacts to soil and water resources are evaluated in this analysis. Impacts to air resources will not be discussed, as the primary impacts to air quality are from sources and causes outside of park boundaries.

Archeological and Ethnographic Resources

Section 106 of the National Historic Preservation Act of 1966 provides the framework for Federal review and protection of cultural resources, and ensures that they are considered during Federal project planning and execution. The park contains many archeological sites as well as lands that are of spiritual or religious significance to one or more of the 15 tribes that have traditional affiliations

with park lands. These cultural resources can be affected by wilderness management activities, thus potential impacts to archeological and ethnographic resources are addressed in this analysis.

Historic Structures

Structures ranging from earthen dams to windmills to roads and dating from the ranching era (ca. 1870 – 1988) are scattered throughout designated and eligible wilderness. Few of these features have been evaluated for eligibility for the National Register of Historic Places. Because the alternatives propose a range of treatments of these features from preservation to restoration to removal, this topic was retained for further analysis.

Impact Topics Dismissed From Analysis

The park's interdisciplinary team analyzed a full range of impact topics to determine the context and intensity of effects that wilderness stewardship may have on those resources. If the magnitude of effects was determined to be nonexistent, negligible, or minor, there is no potential for significant impact and further analysis is unnecessary. Impact topics with these characteristics were dismissed from further analysis.

In making these determinations we defined an impact of negligible intensity as one that is barely perceptible and not measurable. An impact of minor intensity is one that is measurable or perceptible, but would affect a limited area for only a short period of time.

Human Health and Safety

Without proper training and preparation, the Guadalupe Mountains Wilderness can pose a significant danger to the health and safety of visitors and staff alike. All action alternatives emphasize wilderness education; therefore, impacts to human health and safety are dismissed from this analysis.

Environmental Justice

None of the WSP alternatives would impact minority and low- income populations in a disproportionate manner. Therefore, this topic is dismissed from further analysis.

Socioeconomics

Because 95% of the park is already managed as wilderness under the 2012 General Management Plan, implementation of this Wilderness Stewardship Plan will have negligible impacts on local and regional land use, local businesses or other agencies. Potential increases in visitor spending in nearby Salt Flat and Dell City because of increased access to the Salt Basin section of the park are likely to be small. Therefore, the topic of socioeconomics is dismissed from further analysis.

Prime and Unique Farmlands

In August 1980, the Council of Environmental Quality (CEQ) directed federal agencies to assess the effects of their actions on farmland soils classified by the Department of Agriculture's Natural Resources Conservation Services (NRCS) as "prime" or "unique" for the purposes of agriculture. By law, wilderness is not available for farming; the topic of prime and unique farmlands is therefore dismissed as an impact topic.

Wetlands

Presidential Executive Orders mandate the protection of wetlands. Because all alternatives avoid impacts to wetlands located within Guadalupe Mountains National Park wilderness and to their groundwater sources, this topic is dismissed from further analysis.

Floodplains

Executive Order 11988 requires federal agencies to avoid construction within the 100-year floodplain unless no other practicable alternative exists. Management Policies (NPS 2006) and Director's Order 77-2 requires units of the National Park Service to preserve floodplain values and minimize hazardous floodplain conditions. No action taken under any of the alternatives of the Wilderness Stewardship Plan would involve construction in a floodplain; therefore this topic is dismissed from further analysis.

Geological and Paleontological Resources

Section 4.8 of Management Policies (NPS 2006) requires the NPS to preserve and protect geological and paleontological resources. It also requires that park's assess the impacts of human-related events on geological and paleontological resources, maintain and restore the integrity of existing resources, integrate geologic resource management into operations and planning, and interpret geologic resources for park visitors.

As a general mitigation, the NPS surveys for geological and paleontological features during the planning phase of a project. If the Four Peaks route is developed as suggested in Alternatives C and D, there would be no impacts because there would be no movement of soil or rock. However, if this route were formalized as a trail (not proposed in this plan), blasting should be avoided, as this route crosses sections of the Capitan Formation with important fossil resources.

Although activities proposed in the alternatives include removing roads or constructing campgrounds and trails, the cumulative impacts of these activities will be limited to unconsolidated surface sediments and will not affect geological or paleontological resources. This topic is therefore dismissed from further analysis.

Cave Resources

Management Policies (NPS 2006) require that caves located within park wilderness areas are managed as de facto wilderness. In addition, The Federal Cave Resources Protection Act of 1988 requires that significant caves on federal lands be secured, protected, and preserved for the perpetual use, enjoyment and benefit of all people. The Guadalupe Mountains Wilderness contains many karst features, a few of which meet the NPS definition of a cave (greater than 50 feet from entrance to back). All Guadalupe Mountains National Park caves are managed under other policies and documents and therefore this topic was dismissed from further analysis.

In their comments provided during the scoping phase of this Environmental Assessment, the U.S. Fish and Wildlife Service requested that caves potentially containing endemic fauna be given special consideration during the planning process. Nearly all of the park's caves are shallow and/or very open, lacking the humidity, darkness, and habitat complexity needed to support the evolution of an endemic cave fauna. Only four of the park's caves have had any level of survey for cave fauna; the very basic surveys discovered only cave animals that are common to caves throughout the Guadalupe Mountains.

The caves that the park is aware of that have significant speleothems and are true caves are associated with the eastern and western escarpments. These caves are inaccessible without special equipment and training. None of the proposed trails would provide access to any of these caves, nor would any of the caves be visible from any proposed trail or recreation site.

Abiotic Resources (Air Quality)

Management Policies (NPS 2006) requires protection of abiotic resources. These policies are consistent with the 1970 Clean Air Act. Impacts to air resources will not be analyzed in this document, as the primary impacts to wilderness air quality are from sources and causes outside of park boundaries and outside of NPS control.

Ecologically Critical Areas

The Council on Environmental Quality requires consideration of the severity of impact on unique characteristics of the geographic area such as proximity to ecologically critical areas (e.g. biosphere reserve, world heritage site, wild & scenic rivers). The Far West Texas Water Plan (TWDB 2006) identifies McKittrick Canyon and Choza Creek as "Ecologically Unique River and Stream Segments". This designation means only that a state agency may not finance the construction of a reservoir in a designated stream segment. Guadalupe Mountains National Park would not permit such construction in any case; therefore this topic is dismissed from further analysis.

Adjacent Lands

Wilderness management activities would not affect land uses outside wilderness either within the park or in areas adjacent to it. Therefore, this impact topic is dismissed from further analysis.

Visual Resources

Open, unobstructed views with few human intrusions are an important element of the Guadalupe Mountains Wilderness experience. However, because none of the proposed alternatives would have more than a trivial effect on visual resources, this topic was dismissed from analysis.

Fire Management

Fire is an important ecological process in the Guadalupe Mountains and thus a discussion of wilderness stewardship necessitates consideration of fire management. However, fire management in wilderness has already been analyzed and determined in the Fire Management Plan and EA (2005, amended in 2012). Fire management in wilderness would be the same under all alternatives; therefore the topic is dismissed from further analysis.

Indian Trust Resources

Indian trust assets are owned by Native Americans but held in trust by the United States. Indian trust assets do not occur within the Guadalupe Mountains Wilderness and therefore are not evaluated in this environmental assessment.

Cultural Landscapes

The cultural landscapes within Guadalupe Mountains National Park (e.g., Frijole Ranch, Williams Ranch, Pratt Cabin) are located adjacent to but outside of wilderness. Because none of the alternatives proposes changes to the management of the park's cultural landscapes, this topic is dismissed from further analysis.

Museum Collections

Director's Order 24 requires units of the national park system to consider impacts to museum collections (historic artifacts, natural specimens, and archival and manuscript material), and provides policy guidance, standards, and requirements for preserving, protecting, documenting, and providing access to, and use of, National Park Service museum collections.

None of the alternatives of this project would have an impact on the Guadalupe Mountains National Park's museum collection. Therefore, the topic of museum collections is dismissed from further analysis.

Soundscape Management

Management Policies (NPS 2006) and Director's Order # 47 (NPS 2000) require national park units to preserve natural soundscapes. A natural soundscape is the aggregate of all the natural sounds that occur in a park, together with the physical capacity for transmitting natural sounds.

None of the alternatives would add permanent sources of non-natural sounds to park wilderness. Impacts to the soundscape from noise associated with trail construction and ecological restoration activities under the action alternatives would last only as long as the construction is occurring, and would have a minor impact on visitors and employees. Therefore, the topic of soundscape management is dismissed from further analysis.

Lightscape Management

In accordance with Management Policies (NPS 2006), the National Park Service strives to preserve natural ambient lightscapes, which are natural resources and values that exist in the absence of human caused light. None of the WSP alternatives propose adding sources of light; therefore, the topic of lightscape management is dismissed from further analysis.

Resource Conservation, Including Energy, and Pollution Prevention

The National Park Service's Guiding Principles of Sustainable Design provides a basis for achieving sustainability in facility planning and design, emphasizes the importance of biodiversity, and encourages responsible decisions. The guidebook articulates principles to be used such as resource conservation and recycling. Proposed project actions would not add to or subtract from resource conservation or pollution prevention within the Guadalupe Mountains Wilderness; therefore this impact topic is dismissed from further analysis.

Waste Management

No project proposed in any of the alternatives would generate more than minimal quantities of either hazardous or solid wastes that need to be disposed of in hazardous waste or general sanitary landfills. Therefore this impact topic is dropped from further analysis.

Climate Change and Sustainability

Although climatologists are unsure about the magnitude and long-term effects of global climate change, it is clear that the planet is experiencing a warming trend that affects ocean currents, sea levels, polar sea ice, and global weather patterns. Although those changes will likely affect weather patterns within the Guadalupe Mountains Wilderness, especially temperatures and precipitation regimes, it would be speculative to predict localized changes in temperature, precipitation, or other weather phenomena, in part because there are many variables that are not fully understood or defined. Changes to campsites and trails proposed under the action alternatives will have a negligible impact on sustainability, as they will use local materials and be constructed primarily with hand tools. For these reasons, the effects of actions on sustainability and future climate changes are not analyzed further in this document.

ALTERNATIVES

Alternatives Carried Forward

This chapter describes four alternatives: the No Action Alternative and three action alternatives, one of which is the Proposed Action Alternative. Each of the action alternatives is designed to address the goals and objectives of wilderness stewardship in a different way, with different effects on the human environment and the qualities of wilderness character. These alternatives were developed through evaluation by an interdisciplinary team of park staff of comments provided by individuals, organizations, and governmental agencies. If approved, the Proposed Action will operate as the Wilderness Stewardship and Trails Plan. Each alternative is described briefly below.

Alternative A – No Action

Under this alternative, current management activities and policies would continue, current administrative and recreational facilities would be maintained, and the existing range of recreational activities would remain static. Monitoring of wilderness character would not be implemented and no new facilities would be built. Eligible wilderness on the west side of the park would remain largely inaccessible, as no trails or campgrounds would be constructed and overnight use would not be allowed. Ecosystems are protected but there is no active restoration. Historic sites and structures would remain unevaluated and unprotected. Wilderness and Leave-No-Trace messages would continue to be delivered primarily by rangers in the visitor center and on backcountry patrol, and by brochures available to visitors at all contact stations.

Action Alternative B – Emphasis on improving ecosystem integrity and wilderness character

Under this alternative, management actions would be limited to those seeking to improve ecosystem integrity or to restore or protect qualities of wilderness character. Administrative facilities would be removed or minimized. The range of recreational activities would remain largely static, but dispersed (off-trail) hiking and camping would be encouraged. Some trails would be converted to unmaintained routes. Large parts of the wilderness would be open to cross-country travel and open camping (excluding riparian, culturally sensitive, and soil crust areas), and a number of unimproved cross country routes would be marked. No new facilities would be built and campsites in the designated campgrounds would be reconfigured to reflect actual use and to increase solitude. No backcountry toilets would be installed unless monitoring shows that a natural resource or wilderness character is degrading. Wilderness character monitoring would be implemented, and would guide future management decisions within designated and eligible wilderness. Parts of the Salt Basin would be open to overnight use and to overnight stock use, but no trails, campgrounds, or water sources would be developed. The park would take positive steps to restore degraded ecosystems and potentially reintroduce extirpated species such as bighorn sheep (*Ovis canadensis nelsoni*) and Montezuma quail (*Cyrtonyx montezumae*). Historic sites and structures would be inventoried and the most significant would be stabilized. Non-significant historic features would be documented and removed. The Butterfield Trail would not be re-opened until it is included in the National Historic Trail system. Long-Range Interpretive Plan (2007) recommendations for media, exhibits, and programs emphasizing wilderness ideas and concepts are fully implemented.

Action Alternative C – Emphasis on visitor access and enjoyment

Under this alternative, management actions would seek to protect ecosystems and cultural resources while maximizing visitor enjoyment and access to wilderness. Current visitor facilities (campsites and trails) and administrative facilities would remain and new routes and trails would be

developed for a wide range of abilities. The PX Well trail would be restored, thereby connecting Salt Basin trails with the park's high country. A new trail along the base of the eastern escarpment would connect Frijole Ranch with the McKittrick contact station. Overnight stock use would be allowed in the Salt Basin with designated campgrounds supported by restored water sources at PX and Red wells. Backcountry toilets would be installed at the most popular campgrounds and in McKittrick Canyon. Wilderness character monitoring would be implemented and would guide future management decisions within designated and eligible wilderness. Ecosystems would be protected but not restored. Historic sites and structures in wilderness would be inventoried, stabilized, and maintained as discovery sites. The Butterfield Trail would be restored as a Texas Heritage Trail. Long-Range Interpretive Plan (2007) recommendations for media, exhibits, and programs emphasizing wilderness ideas and concepts are fully implemented.

Proposed Action Alternative (D) – Protect and Restore Natural and Cultural Resources While Increasing the Range of Recreational Opportunities within Wilderness

Existing visitor facilities would remain. New routes and trails would be developed for a wide range of abilities, in the Salt Basin, the high country, and along the eastern escarpment. The PX Well trail would be restored, thereby connecting Salt Basin trails with the park's high country. A new trail along the base of the eastern escarpment would connect Frijole Ranch with the McKittrick contact station. Water caches would be minimized; other administrative facilities re-evaluated every few years and removed if deemed no longer necessary. Current campsites would be maintained, with administrative sites added near Guadalupe Peak, Marcus, and McKittrick Ridge campgrounds to enhance a sense of solitude for visitors. A dry hike-in campground would be developed in the quartz dunes area of the Salt Basin and overnight stock use would be allowed at designated campgrounds supported by restored water sources at PX and Red wells. No backcountry toilets would be installed unless monitoring shows that a natural resource or wilderness character is degrading. Wilderness character monitoring would be implemented and would guide future management decisions within designated and eligible wilderness. New restoration projects would target Chihuahuan desert grasslands in the Salt Basin, with a goal of supporting declining species such as pronghorn antelope and Montezuma quail. Historic sites and structures would be inventoried and evaluated; non-significant historic features would be removed if they pose a hazard to humans or the environment. The Butterfield Trail would not be re-opened as a formal trail but would be marked as a route. Long-Range Interpretive Plan (2007) recommendations for media, exhibits, and programs emphasizing wilderness ideas and concepts would be fully implemented.

Environmentally Preferable Alternative

The National Park Service is required to identify the environmentally preferable alternative(s) for any of its proposed projects. The environmentally preferred alternative is the alternative that best fits national environmental policy expressed in NEPA (Sec. 101 (b)). This includes alternatives that:

- fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
- ensure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings.
- attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.

- preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.

In essence, the environmentally preferable alternative would be the one(s) that “causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources” (NPS Director’s Order 12, undated).

In this case, all alternatives meet the purpose of the environmentally preferable alternative to varying degrees; however, only Alternative D includes the balance of resource protection and beneficial use required under NEPA and DOI policy. Reasons for rejecting the other alternatives are described below.

Alternative A (No Action) and Alternative B (Ecosystem/Wilderness Character Emphasis) – These alternatives are not environmentally preferable in that they would continue to limit “beneficial uses” of eligible wilderness in the Salt Basin, and would not actively protect the most significant historic sites in wilderness.

Alternative C (Recreation Emphasis) – This alternative is likewise not environmentally preferable in that serving as a trustee of the environment takes second place to recreational and other human uses of wilderness.

Alternatives Considered and Dismissed

Alternative E - Manage Eligible and Designated Wilderness Differently

This alternative would allow some activities not allowed in designated wilderness to take place in the park’s backcountry (areas deemed eligible for wilderness consideration but not yet designated as wilderness). This alternative was considered primarily because of a number of internal comments in favor of mountain biking opportunities within the park or that wanted to re-open the Butterfield Mail Route Trail as a multiple use trail. We dismissed this alternative because it was not consistent with direction given in the park’s General Management Plan (2012) to manage the backcountry in order to protect its wilderness character.

Alternative Summary Tables

Table 2 summarizes the major components of all alternatives and compares the ability of these alternatives to meet the project goals and objectives identified in Chapter 1 (Purpose and Need).

Table 3 summarizes the anticipated environmental impacts for each alternative. Only those impact topics that have been carried forward for further analysis are included in this table. Chapter 3 (Affected Environment and Environmental Consequences) provides a more detailed explanation and analysis of these impacts.

Table 2. Summary of draft alternatives and how each alternative responds to project goals and objectives.

Project Goals and Objectives	Alternative A - No Action	Alternative B - Emphasis on improving ecosystem integrity and wilderness character	Alternative C - Emphasis on visitor access and enjoyment	Alternative D - Protect and restore natural and cultural resources while increasing range of wilderness recreation opportunities
	Continue current policies, maintain current facilities and levels of access to park wilderness	Emphasis on restoring natural and undeveloped character of wilderness. Facilities decrease; small increase in recreational opportunities.	Emphasis on developing new, appropriate recreational opportunities and facilities; maintain current natural and undeveloped character.	Improve natural and undeveloped character of wilderness. A minimum of facilities maintained; moderate increase in recreational opportunities.
Goal: To establish a comprehensive plan that provides for the protection of the park’s wilderness character in keeping with the requirements of the Wilderness Act				
Objective: Protect the park's wilderness resources and manage them to preserve or improve their natural conditions (Natural Quality of Wilderness)	Current conditions maintained. Degraded ecosystems left to recover naturally. Minimal efforts to control exotic plants and animals.	Active programs to restore ecosystems. Control programs to eradicate or minimize exotic plants and animals. Reintroduce bighorn sheep, quail, pronghorn, and other species of concern.	Current conditions maintained. Degraded ecosystems left to recover naturally. Exotic plants and animals controlled at approximately current levels; seek to prevent new infestations	Active programs to restore ecosystems and reintroduce extirpated species, especially desert grasslands. Control programs seek to minimize exotic plants and animals and to prevent new infestations.
Objective: Wilderness appears to have been affected primarily by the forces of nature; imprint of modern humans substantially unnoticeable. (Undeveloped / Untrammelled qualities of Wilderness)	Undocumented / unevaluated ranching artifacts remain scattered throughout eligible and designated wilderness. Site documentation is minimal. Structures not stabilized or interpreted.	Inventory all historic sites and artifacts. Document and remove/rehabilitate all sites that are not eligible for the National Register of Historic Places.	Ranching artifacts inventoried and evaluated. Non-significant sites removed and restored. Significant features stabilized and left as “discovery” sites with off-site interpretation.	Ranching artifacts inventoried and evaluated. Sites are only removed if they pose a danger to the public or the environment. Most features left as “discovery” sites with off-site interpretation.
Objective: Provide outstanding opportunities for solitude or a primitive and unconfined type of recreation	Open camping area remains limited and little-known. West side of park remains largely inaccessible and is open for day use only.	Open camping area increased somewhat, some new routes available for off-trail travel. West side of park remains trail-less, with open camping in areas without biological soil crusts.	Open camping area increased significantly. New trails and routes will also help to spread out use and increase range of opportunities.	Open camping area increased moderately. New trails and routes will also help to spread out use and increase range of opportunities.
Objective: Protect the outstanding and unique geological and paleontological resources found within wilderness.	Protection is primarily passive	Significant geological and paleontological sites near recreation sites are monitored and protected.	Significant geological and paleontological sites near recreation sites are monitored and protected.	Significant geological and paleontological sites near recreation sites are monitored and protected.
Goal: To maintain the minimum amount of infrastructure in wilderness necessary to employee and visitor safety and resource protection				
Objective: Maintain a minimum number of administrative sites for shelter, water caches, and communications	Maintain 3 radio repeaters (at two sites), 14 semi-permanent water caches, one patrol cabin, 2 RAWs fire weather stations	Maintain three 3 repeaters and 2 RAWs weather stations. Water caches exist only where projects require them and are removed promptly. Pinetop cabin is not maintained and is removed when deteriorated.	Maintain 3 radio repeaters, 2 RAWs weather stations, and Pinetop cabin. Permanent water caches maintained at Pinetop Cabin and Marcus Campground; temporary caches staged as needed for administrative or special used removed promptly.	Maintain 3 radio repeaters, 2 RAWs weather stations. Reassess need for Pinetop cabin every 5 years and remove if use drops below a threshold level. Permanent water caches maintained at Pinetop Cabin and Marcus Campground; other caches for administrative uses removed promptly.
Objective: Install sustainable toilets where monitoring (e.g., water quality, sanitation violations) indicate a need.	No toilets in wilderness. Toilet paper and human waste potentially pose a threat to visitor experience, health, and water quality.	No toilets in wilderness. Provide additional education to visitors about correct sanitary procedures in wilderness.	Install backcountry toilets near Guadalupe Peak CG and near Pratt Cabin in McKittrick Canyon.	Continue to monitor sanitation violations and water quality. If a pre-determined threshold is crossed, initiate process to determine how best to protect resources.
Goal: To increase access to and the range of appropriate recreational opportunities within wilderness				
Objective: Size, location, and arrangement of campgrounds are within carrying capacity of the local environment and reflect actual use.	Maintain 59 campsites in 10 backcountry campgrounds, all in designated wilderness. No campgrounds developed in Salt Basin.	Remove and rehabilitate at least two campsites in all campgrounds except Pinetop & Guad Peak to reflect actual use & carrying capacity and increase solitude. Remove Blue Ridge Campground. Campsites reduced to a maximum of 41. No campgrounds developed in Salt Basin but open camping allowed.	Maintain existing inventory of campsites. Add two sites at Guadalupe Peak CG. Expand open camping area to include all of wilderness except sensitive areas. Develop new campgrounds developed near PX and Red wells with stock water available.	Maintain existing campsites. Expand open camping areas and encourage use. New campgrounds near PX and Red wells with stock water. Develop a hike-in campground in the quartz dunes. Add admin (ranger) sites at McKittrick Ridge, Marcus, and Guadalupe Peak CGs.

Project Goals and Objectives	Alternative A - No Action	Alternative B - Emphasis on improving ecosystem integrity and wilderness character	Alternative C - Emphasis on visitor access and enjoyment	Alternative D - Protect and restore natural and cultural resources while increasing range of wilderness recreation opportunities
	Continue current policies, maintain current facilities and levels of access to park wilderness	Emphasis on restoring natural and undeveloped character of wilderness. Facilities decrease; small increase in recreational opportunities.	Emphasis on developing new, appropriate recreational opportunities and facilities; maintain current natural and undeveloped character.	Improve natural and undeveloped character of wilderness. A minimum of facilities maintained; moderate increase in recreational opportunities.
Objective: Develop new routes and trails for a range of abilities	No new trails or routes developed. Maintain 68 miles of wilderness trails and the 1.25-mile marked route on Manzanita Ridge.	Bush Mountain Trail not maintained, becomes a route from Blue Ridge Trail to Marcus CG. Other trails maintained. No trails developed in Salt Basin but off-trail use allowed. Butterfield Trace not developed, but interpreted in Visitor Center.	Maintain existing trails. New Salt Basin trails: overnight stock loop, quartz/gypsum dune overnight foot loop, Butterfield Trail. Connect Salt Basin trails with existing system using the Kincaid Trail and/or PX trail. New routes cairned to Four Peaks, Manzanita Ridge, El Capitan.	Maintain existing trails. New routes cairned to Four Peaks, Manzanita Ridge, El Capitan, PX. New trails: Gypsum Dune traverse, stock overnight loop, dune overnight foot loop, base of eastern escarpment. Butterfield Trail is undeveloped route.
Goal: To ensure that overnight camping and stock use are consistent with resource protection while providing access to remote areas within wilderness				
Objective: Allow overnight stock use where resource resilience allows.	No overnight stock use anywhere in the park outside of Dog Canyon and Frijole corrals.	No overnight stock use anywhere in the park outside of Dog Canyon and Frijole corrals.	Overnight stock use permitted on existing stock trails and on new stock trail on west side.	Overnight stock use permitted on new stock trail on west side.
Objective: Increase opportunities for pack stock on a wider range of trails.	All pack stock limited to current designated stock trails (40 miles)	All pack stock limited to current designated stock trails.	Allow "low-impact" animals (e.g., llamas) to use entire trail system. New stock trails in Salt Basin.	All pack stock limited to designated stock trails, but these increase in number.
Goal: To establish a wilderness character monitoring program to track trends in the five qualities of wilderness character				
Objective: Monitoring is based on the standards, indicators, and measures in Wilderness Core Elements (App. B)	Monitoring uses basic indicators only (e.g., backcountry permits). Results inform wilderness management decisions.	Wilderness Character monitoring is fully implemented (Mills 2010).Results guide adaptive management of eligible / designated wilderness.	Wilderness Character monitoring is fully implemented (Mills 2010).Results guide adaptive management of eligible / designated wilderness.	Wilderness Character monitoring is fully implemented (Mills 2010).Results guide adaptive management of eligible / designated wilderness.
Goal: To improve the naturalness of wilderness character by restoring native species and ecosystems.				
Objective: Reduce or eliminate exotic species of plants and animals from wilderness	Exotic removal projects as resources are available with the goal of containing existing infestations.	Controlling exotic species of plants and animals and restoring native species and ecosystems is a priority, using minimum tools in wilderness.	More visitor access and use may mean introduction and increased spread of exotic plants. Contain new and existing infestations.	Prioritize control of exotics with greatest potential to alter ecosystems. Active programs to limit the spread and prevent new infestations.
Objective: Restore Chihuahuan Desert grasslands in the Salt Basin and resilient forest structure in high country	No active restoration program. Prevent further degradation but allow nature to take its course without assistance.	Use Minimum Requirements Analysis to determine the lowest-impact way to accomplish this goal.	No active restoration program. Prevent further degradation but allow nature to take its course without assistance.	Use Minimum Requirements Analysis to determine the lowest-impact way to accomplish this goal.
Goal: To maintain historic structures and sites in wilderness that are significant contributors to our understanding of the history of European settlement and ranching				
Objective: Conduct surveys of historic sites and structures in wilderness to determine eligibility for the National Register of Historic Places.	Inventory and evaluation of historic resources only as needed for individual projects.	Comprehensive survey of historic sites and structures in wilderness.	Comprehensive survey of historic sites and structures in wilderness.	Comprehensive survey of historic sites and structures in wilderness.
Objective: Stabilize and protect sites and structures that are determined eligible for the National Register.	No resources committed to stabilizing or protecting eligible sites or structures.	Most sites are documented and removed. Only the most significant are stabilized and protected.	Sites are documented and most remain as discovery sites. Significant sites are stabilized and interpreted.	Sites are documented and those that contribute to a coherent history of the area are interpreted but only the most significant are stabilized.
Objective: Remove and rehabilitate sites and structures that are not eligible for the National Register.	Complete existing interior fence removal project.	Inventory, document, and remove all historic features not eligible for the National Register.	Inventory / document historic features; interpret those of interest regardless of eligibility. Stabilize most significant features.	Inventory / document historic features, retain as discovery sites and interpret off-site. Most sites allowed to deteriorate naturally.
Goal: To increase the degree to which wilderness users understand and appreciate the unique qualities of GUMO wilderness				
Objective: Develop interpretive and educational media, programs, & activities to increase visitors' understanding and appreciation of GUMO wilderness.	Wilderness information available primarily from visitor center desk staff and backcountry patrol rangers.	New interpretive exhibits and social media emphasize wilderness messages and ethics.	New interpretive exhibits and social media emphasize wilderness messages and ethics.	New interpretive exhibits and social media emphasize wilderness messages and ethics.

Table 3. Environmental and cumulative impact summary of each alternative on impact topics selected for analysis.

Impact Topics Analyzed in This Environmental Assessment	Alternative A - No Action	Alternative B - Emphasis on improving ecosystem integrity and wilderness character	Alternative C - Emphasis on visitor access and enjoyment	Alternative D - Protect and restore natural and cultural resources while increasing range of wilderness recreation opportunities
	Continue current policies, maintain current facilities and levels of access to park wilderness	Emphasis on restoring natural and undeveloped character of wilderness. Facilities decrease; small increase in recreational opportunities.	Emphasis on developing new, appropriate recreational opportunities and facilities; maintain current natural and undeveloped character.	Improve natural and undeveloped character of wilderness. A minimum of facilities maintained; moderate increase in recreational opportunities.
Visitor Experience	Environmental: Negligible Cumulative: Negligible	Environmental: Minor Cumulative: Moderate	Environmental: Moderate Cumulative: Major	Environmental: Moderate Cumulative: Moderate
Park Operations	Environmental: Negligible Cumulative: Negligible	Environmental: Minor Cumulative: Minor	Environmental: Moderate Cumulative: Major	Environmental: Moderate Cumulative: Moderate
Wilderness Character	Environmental: Negligible Cumulative: Minor	Environmental: Moderate Cumulative: Major	Environmental: Minor Cumulative: Moderate	Environmental: Minor Cumulative: Moderate
Biotic Resources	Environmental: Negligible Cumulative: Negligible	Environmental: Major Cumulative: Major	Environmental: Moderate Cumulative: Moderate	Environmental: Moderate Cumulative: Moderate
Special Status Species	Environmental: Negligible Cumulative: Negligible	Environmental: Minor Cumulative: Minor	Environmental: Minor Cumulative: Minor	Environmental: Minor Cumulative: Minor
Abiotic Resources (Water, Soil)	Environmental: Negligible Cumulative: Negligible	Environmental: Negligible (Water), Minor (Soil) Cumulative: Negligible (Water), Minor (Soil)	Environmental: Minor (Water and Soil) Cumulative: Minor (Water and Soil)	Environmental: Negligible (Water), Minor (Soil) Cumulative: Negligible (Water), Minor (Soil)
Archeological/Ethnographic Resources	Environmental: Negligible Cumulative: Minor	Environmental: Minor Cumulative: Minor	Environmental: Moderate Cumulative: Moderate	Environmental: Moderate Cumulative: Moderate
Historic Structures	Environmental: Negligible Cumulative: Negligible	Environmental: Moderate Cumulative: Major	Environmental: Minor Cumulative: Moderate	Environmental: Minor Cumulative: Moderate

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the affected environment (existing setting or baseline conditions) and analyzes the potential impacts that would occur as a result of implementing a Wilderness Stewardship and Trails Plan. Impact thresholds, direct, indirect, and cumulative effects are analyzed for each impact topic identified in Chapter 1. Cumulative impacts are also considered. Potential impacts are described in terms of type, context, duration, and intensity, defined below.

Type classifies the impact as *beneficial* or *adverse*, *direct* or *indirect*:

Beneficial: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.

Adverse: A change that moves the resource away from a desired condition or detracts from its appearance or condition.

Direct: An effect that is caused by an action and occurs in the same time and place.

Indirect: An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.

Context describes the area or location in which the impact would occur. Effects may be site-specific, local, regional, or even broader.

Duration describes how long an impact affects the resource:

Short-term impacts generally last only during implementation; the resource resumes its pre-construction condition once implementation is complete.

Long-term impacts last beyond the implementation period; the resource may not resume its pre-construction condition for some time after implementation is complete.

Intensity describes the degree, level, or strength of an impact. For this analysis, we characterize intensity as *negligible*, *minor*, *moderate*, or *major*. Because the definition of "intensity" varies according to the resource being analyzed, intensity definitions are provided separately for each impact topic.

Cumulative Impact Scenario

Council on Environmental Quality regulations require an assessment of cumulative impacts for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for each alternative, including the no action alternative.

Cumulative impacts are determined for each of the impact topics by combining the impacts of actions proposed in each alternative with other past, present, and reasonably foreseeable future actions. "Reasonably foreseeable" actions include those proposed in other park planning documents or projects that are currently in the NPS funding pipeline.

Visitor Use and Experience

Affected Environment

The NPS Organic Act (1916) and Management Policies 2006 (NPS 2006) emphasize that the enjoyment of park resources and values by people is a fundamental purpose of the national park system. The National Park Service is committed to providing appropriate, high quality opportunities for visitors to enjoy the natural and cultural resources unique to each park, and to maintain within each park an atmosphere that is open, inviting, and accessible to every segment of society.

More than 95% of Guadalupe Mountains National Park is managed as wilderness; however, the range of recreational opportunities and experiences available in the park's wilderness is limited. In order to experience the Guadalupe Mountains Wilderness, most visitors must commit to a strenuous hike of at least three miles (one way) with a gain of at least 2000 feet of elevation. Overnight camping is available to hikers only; no pack stock is allowed overnight in the wilderness. A lack of water sources in wilderness limits most backcountry trips to no more than three days. Because of these rigorous conditions, most visitor use is concentrated in the front country and those parts of the wilderness closest to the trailheads (Table 4).

Table 4. Backcountry campground use statistics, 1992-2013. Backcountry campground data were not separated by location before 1992.

Campground	Average Annual Use (Camper-nights)	Distance in Miles From Nearest Trailhead	Major Climb(s)
Guadalupe Peak	603	3.1 (Pine Springs)	2,200 feet
Pinetop	655	4.2 (Pine Springs)	2,300 feet
Tejas	400	5.5 (Pine Springs)	2,300 feet
Bush Mountain	196	6.2 (Pine Springs)	2,000 and 500 feet
Blue Ridge	120	7.8 (Pine Springs)	2,300 and 900 feet
McKittrick Ridge	375	7.6 (Pine Springs)	2,650 feet
Shumard	18	9.2 (Pine Springs)	-800 feet
Wilderness Ridge	75	4.0 (McKittrick)	2,000 feet
Marcus	80	3.7 (Dog Canyon)	1,000 and 250 feet
Mescalero	312	4.7 (Dog Canyon)	2,000 feet

The park maintains records of how many people visit the park. Data from 1971 through 2013 are summarized in Figure 3. Annual visitation to the park peaked in 1997 at 231,980 visitors and average annual visitation over this period is 155,661 visitors. Most park visits occur in the spring, summer, and fall months; December through February see relatively few visitors (Figure 4).

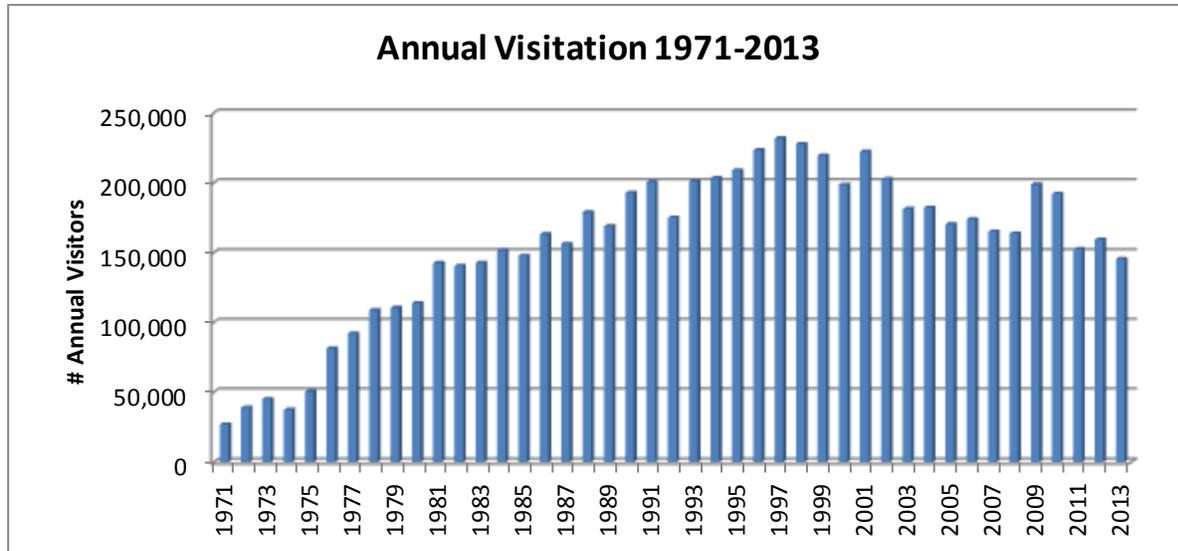


Figure 3. Total annual visitation to Guadalupe Mountains National Park, 1971-2013

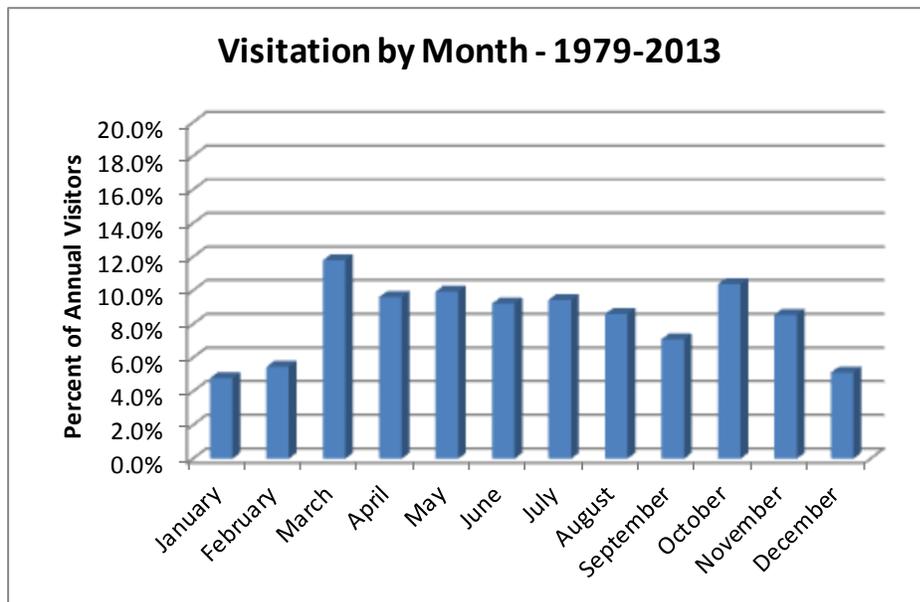


Figure 4. Total park visitation by month, 1979-2013. Monthly visitation records were not kept before 1979.

The park also collects data (from backcountry permits) on how many people stay overnight in any of ten wilderness campgrounds. Annual patterns of overnight backcountry use appear in Figure 5. Average annual overnight backcountry use over this period is 2,944 visitors. Backcountry use peaks in March (corresponding to Spring Break); another 23% occurs in the October-November period corresponding to Fall Colors (Figure 6). Overnight backcountry use peaked in 1994 at 4,152 visitors.

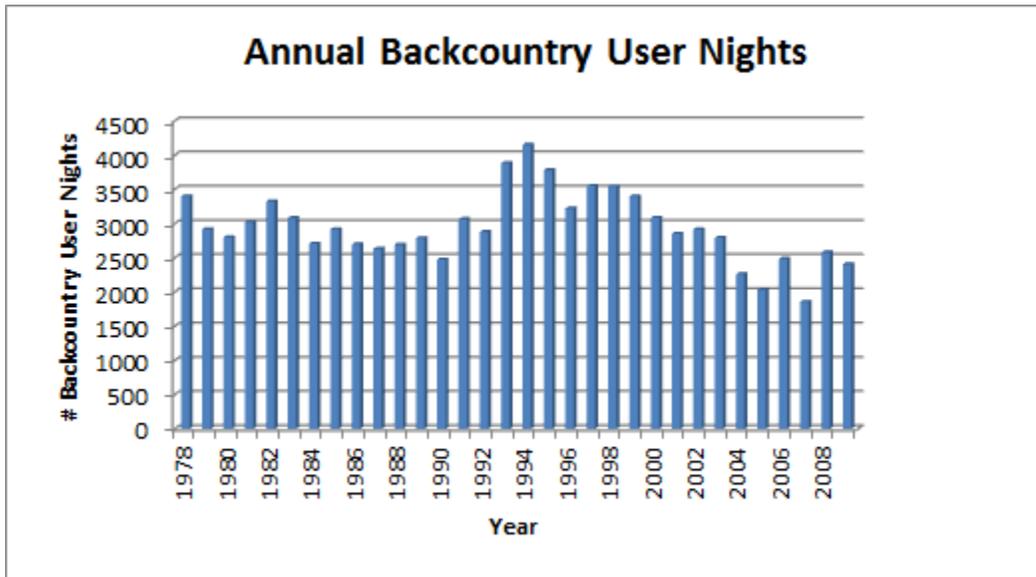


Figure 5. Annual number of visitors staying overnight in the backcountry of Guadalupe Mountains National Park, 1978-2009. These numbers do not include campers staying in the frontcountry Pine Springs campground.

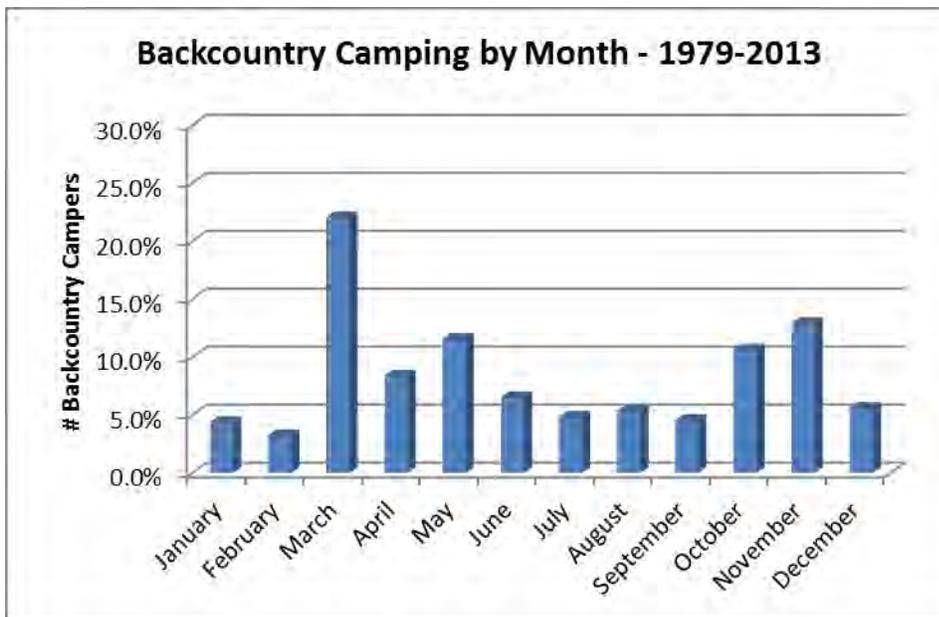


Figure 6. Patterns of seasonal use by backcountry campers, 1979-2013. The spike in backcountry use in March corresponds to spring break for Texas and New Mexico schools. The smaller spike in October and November corresponds to “fall colors”, when maples and oaks in the mountain canyons put on a spectacular display.

Existing Campgrounds, Trails, and Routes

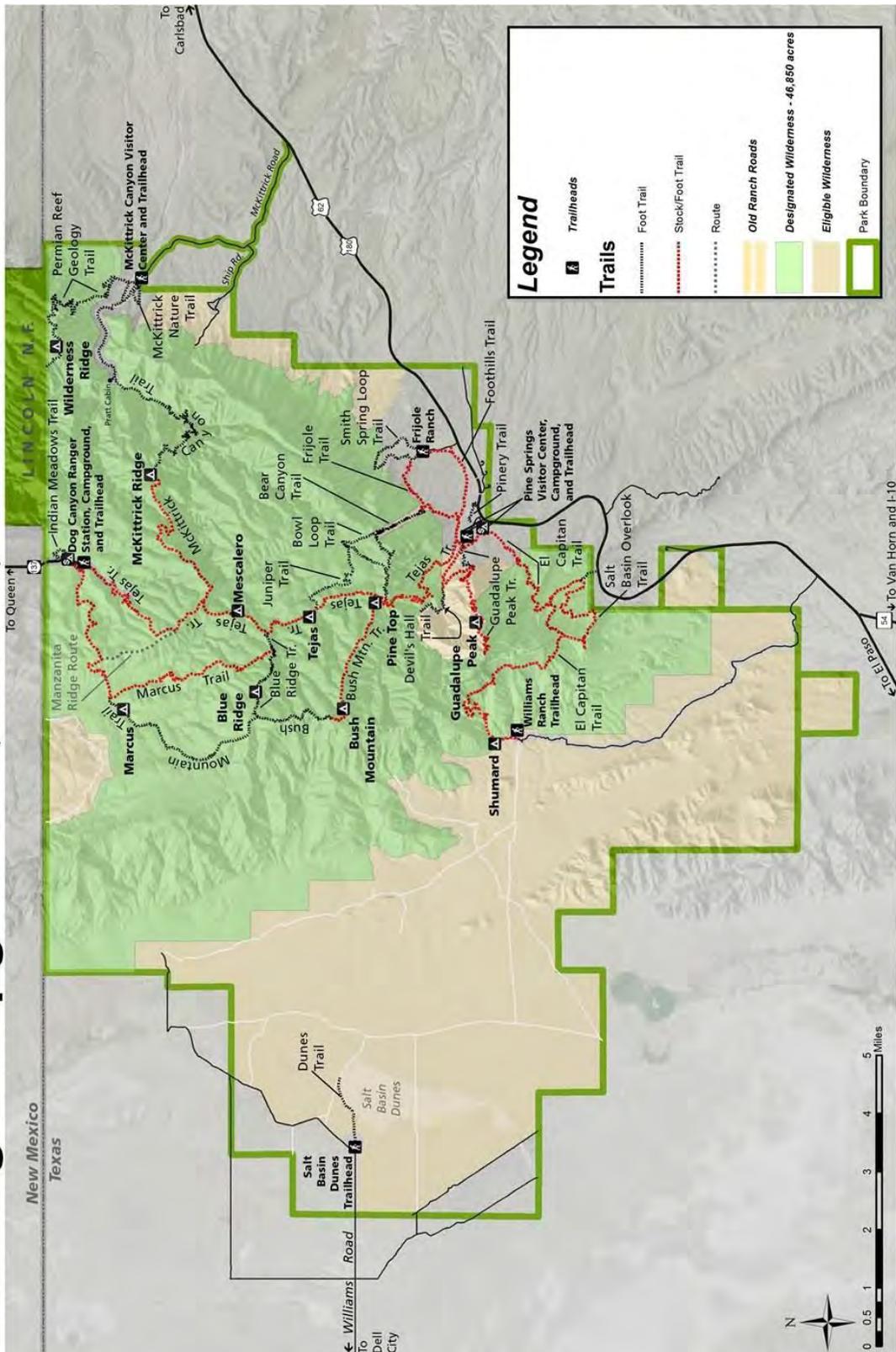


Figure 7. Existing system of maintained trails and unmaintained routes at Guadalupe Mountains National Park.

GUMO has only limited data tracking day use of the park's 84 miles of trails. Trail counters recorded use on the more popular trails in the spring and early summer of 2002-2003. These data, combined with information taken from trail registers (where hikers voluntarily record their route and the number of people in their party), indicate that the most popular trails are (1) Guadalupe Peak Trail, (2) McKittrick Canyon Trail, (3) Smith Springs Loop, and (4) Tejas (Figure 7). The least-used trails include El Capitan, Bush Mountain, and Blue Ridge (Figure 7).

The Salt Basin (western) section of the park, totaling more than 30,000 acres, is open to day use only, with no facilities other than a parking lot/trailhead and a short trail to the gypsum dunes. At present, a few hundred of the park's 180,000 annual visitors experience any part of the Salt Basin. The primary attraction in this part of the park is the gypsum dune field; other features of interest include remnants of the area's ranching history and an expansive desert landscape with unparalleled views of Guadalupe Mountains' western escarpment. The park's main visitor center is at Pine Springs, with intermittently-staffed contact stations at Dog Canyon, Frijole Ranch, Dell City, and McKittrick Canyon. Tent and RV camping are available year-round at Pine Springs and Dog Canyon in addition to 10 backcountry campgrounds with no water or facilities. More than 80 miles of hiking trails range offer opportunities for exploring the foothills and high country of the Guadalupe Mountains.

Hikers and backpackers can access the wilderness from the contact stations and visitor centers mentioned above, as well as from Williams Ranch. A new backcountry access point (parking, picnic area, and trailhead) has just been completed near the gypsum dunes in the park's Salt Basin.

Intensity Level Definitions

Guadalupe Mountains is a wilderness park. The methodology used for assessing impacts to visitor use and experience is based on how proposed facilities and management actions would affect the visitor, with particular attention to visitors' access to wilderness and their experience of the park's wilderness character.

For purposes of analyzing potential impacts to visitor use and experience, the thresholds of change for the intensity of an impact are defined as follows:

Negligible - Visitors would not be affected or changes in visitor use and/or experience would be well within the normal range of variation. Any effects would be short-term. The visitor would not likely be aware of the effects associated with the alternative.

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

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

Major - Changes in visitor use and/or experience would be readily apparent and have substantial long-term consequences. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about them.

Impacts of Alternative A – No Action

Alternative A would have negligible effects on visitor use and experience because wilderness access, opportunities, and facilities would remain unchanged. Most use of the wilderness would continue to originate out of Pine Springs and be concentrated within five miles of the trailhead. Visitation to the Salt Basin will increase somewhat because of the new trailhead facility (completed in July 2014) and because visitors will no longer need to get a gate key to access this area.

However, visitor use in the Salt Basin would be limited by of the lack of trails and campgrounds and because only day use would be allowed.

Cumulative Effects: Under Alternative A, visitor opportunities in the Guadalupe Mountains wilderness are not expected to change. Past actions affecting visitor experience include development of the trail and backcountry campground system, but this has been stable for many years. Foreseeable future actions consist primarily of maintenance of these facilities. Cumulatively, visitor use and experience would not change appreciably when considered with other past, present, and reasonably foreseeable future actions.

Impacts of Alternative B – Emphasis on improving ecosystem integrity and wilderness character

Under Alternative B, the impacts to backcountry visitor use and experience would be minor. There would be more opportunities for users with a higher level of fitness to experience solitude and unconfined recreation in all parts of the park. The Salt Basin would be open to exploration on foot or horseback, but the lack of a trail system may discourage less-experienced visitors. There would be fewer developed facilities such as designated campgrounds and maintained trails. During busy times of year there would be fewer designated campsites available and visitors would have to allow time to find an appropriate off-trail site to camp.

Cumulative Effects: Under Alternative B, there would be fewer facilities but more opportunities to experience primitive and unconfined recreation in the Guadalupe Mountains Wilderness. Past actions affecting visitor experience include development of 84 miles of trails and 10 backcountry campgrounds, but this system has been stable for many years. Foreseeable future actions consist primarily of removal of up to 18 campsites and the Blue Ridge campground and routine maintenance of the remaining facilities. Cumulatively, backcountry visitor use and experience would see moderate cumulative impacts when considered with other past, present, and reasonably foreseeable future actions.

Impacts of Alternative C – Emphasis on visitor access and enjoyment

Under Alternative C, the impacts to visitor use and experience would be moderate. More than 40 miles of new trails would be developed in the Salt Basin and connecting the basin to the existing system of trails in the high country (Figure 8). The Butterfield Stage Mail Route would be reopened as a historic trail. Two sites would be added to the Guadalupe Peak campground and new campgrounds for stock users would be developed near Red and PX wells. A hike-in campground would be constructed in the quartz dunes section of the Salt Basin. New routes in the high country would challenge fit and experienced backcountry visitors. There would be increased opportunities for solitude and unconfined recreation, as use would be spread over a larger area and open camping would be allowed in most of the wilderness. Visitors with pack stock would be able to camp overnight in the Salt Basin at designated campgrounds with water. Backcountry toilets in the most heavily used areas would improve visitor experience by reducing the numbers of sanitation violations along popular trails.

Cumulative Effects: Under alternative C, visitors would have approximately 44 more miles of trails to explore, many of which would be less strenuous than existing trails. Camping opportunities would likewise increase with three new backcountry campgrounds. Past actions affecting visitor experience include development of 84 miles of trails and 10 backcountry campgrounds, but this system has been stable for many years. Constructing the new trails, campgrounds, and toilets would create additional impacts to visitor experience during construction and maintenance activities (closures, noise, dust), but these impacts would be of short duration, would occur primarily during times of low visitor use, and probably spread out over several years. Foreseeable future impacts would include those from maintaining the new trails, campgrounds, and toilets.

Cumulative effects to visitor use and experience therefore would be major. Most, but not all visitors would see the changes and effects as beneficial.

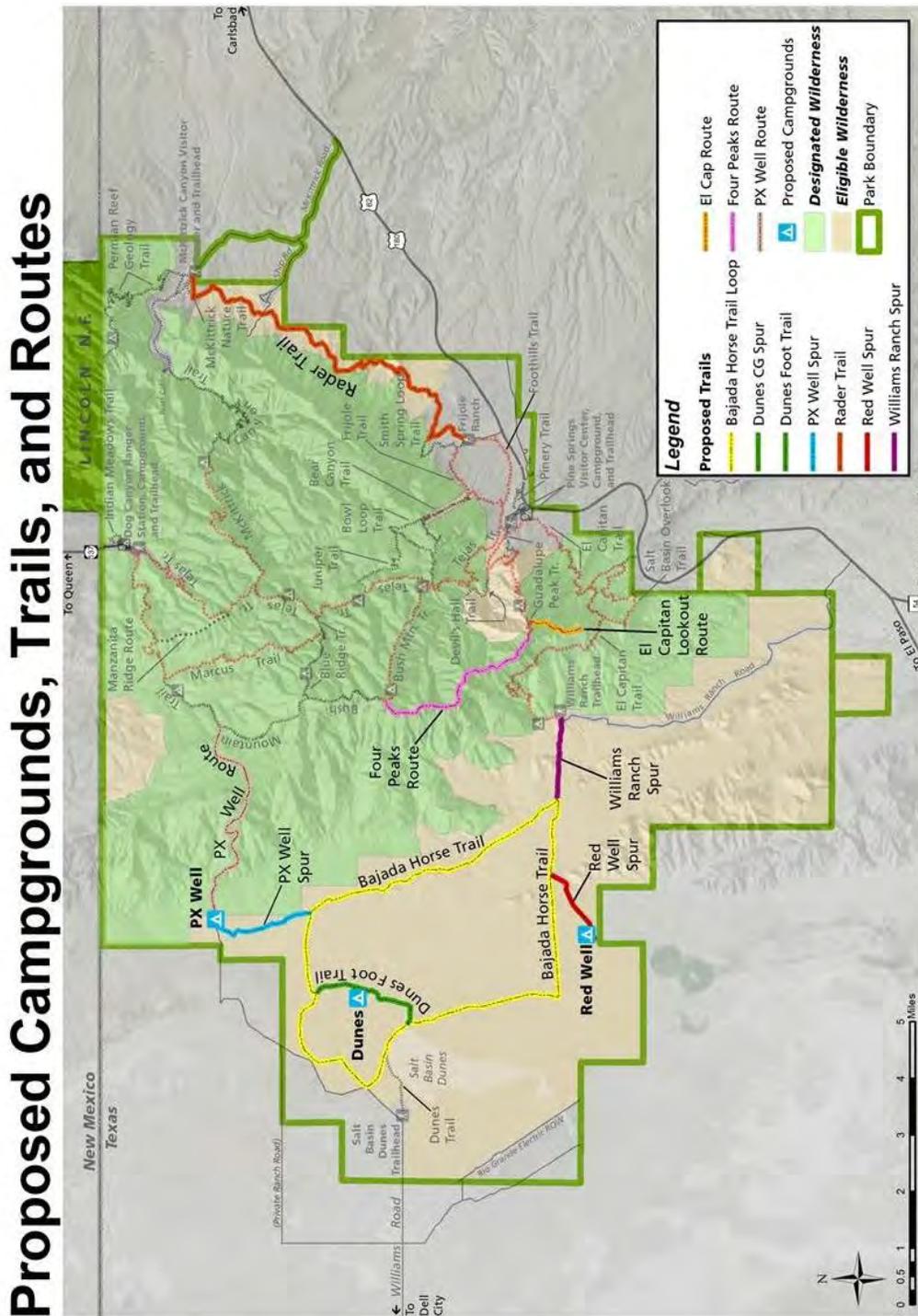


Figure 8. New trails, routes, and campgrounds proposed in Alternatives C and D. Most of the new development would be in the park's Salt Basin, although a new trail and campground would also be constructed along the base of the eastern escarpment.

Impacts of Alternative D – Protect and Restore Natural and Cultural Resources While Increasing the Range of Recreational Opportunities within Wilderness

Under Alternative D, the impacts to visitor use and experience would be moderate. The trail system would increase by 38 miles of new trails in the Salt Basin and a new trail connecting McKittrick Canyon and Pine Springs (Figure 8). Administrative camping sites would be added near the Guadalupe Peak, Marcus, and McKittrick Ridge campgrounds; new campgrounds for stock users would be developed near Red and PX wells, and a hike-in campground would be constructed in the quartz dunes section of the Salt Basin. New routes marked in the high country would challenge fit and experienced backcountry users. Opportunities for solitude and unconfined recreation would increase somewhat because use would be spread over a larger area, although off-trail use and camping would be limited to specific areas. Information would be developed to enable adventurous history buffs to experience the Butterfield Stage Mail Route. Visitors with pack stock would be able to camp overnight in the Salt Basin at designated campgrounds with water.

Cumulative Effects: Under alternative D, the trail system would increase by approximately 32 miles (38%), and three new campgrounds would be developed. Impacts will be associated primarily with construction and maintenance of the new facilities (dust, noise, closures). Past actions affecting visitor experience include development of 84 miles of trails and 10 backcountry campgrounds, but this system has been stable for many years. The only potential future development would be the addition of backcountry toilets on Guadalupe Peak and/or McKittrick Canyon if monitoring determines there is an issue that can't be solved in any other way. Together with previous impacts associated with developing and maintaining current backcountry facilities, the cumulative effects to visitor use and experience would be moderate and perceived as beneficial by most visitors.

Park Operations

Affected Environment

Even within a wilderness park such as Guadalupe Mountains, there are numerous park operations that must be performed regularly in wilderness for the park to run smoothly and to provide for an effective visitor experience. These include maintenance and rehabilitation work on administrative facilities, maintenance of trails and campsites, resource management activities, backcountry patrols, and boundary fence maintenance.

In addition to the above, our analysis of impacts to park operations includes considerations of (1) employee and visitor health and safety, (2) ability to protect and preserve resources, (3) whether volunteer, seasonal, and/or permanent staff need to be increased or decreased, (4) existing and needed facilities, (5) communication (i.e., the park radio system).

Administrative Facilities. Administrative facilities in the Guadalupe Mountains Wilderness include one RAWs weather station (The Bowl), two radio repeaters (Bush Mountain and Frijole Ridge), two permanent administrative water caches (Marcus and Pinetop), and a patrol cabin (Pinetop). These facilities are considered to be the minimum necessary for employee and visitor safety and in order that park staff can carry out other administrative functions, such as resource management and backcountry patrols.

Campsites and Trails. Within the Guadalupe Mountains Wilderness the park maintains approximately 68 miles of trails and 59 campsites in 10 campgrounds. Forty miles of the wilderness trail system are open to pack stock; the remainder is for foot travel only. Campsites and trails are

maintained on a rotating basis; more heavily used trails are maintained (clearing brush, leveling tread, removing rocks, clearing water bars) more frequently (1-3 years) than are the more remote, less-traveled trails (4-8 years). Campsites (tent pads, signs, access trails) are maintained on a seven-year rotation. Maintenance is generally accomplished using hand tools and local materials.

Resource Management. Resource management activities in the Guadalupe Mountains wilderness include inventory and monitoring of sensitive species and plant communities, and controlling exotic plants. Some activities occur on a regular schedule, while others are limited to times when project funds and staff are available.

Backcountry Patrols. Rangers patrol trails in the Guadalupe Mountains wilderness on foot or occasionally on mules. The main objectives for these patrols are to make visitor contacts and check the condition of trails and campsites. Popular trails tend to be patrolled more often than remote areas of the wilderness. There is generally one ranger in the backcountry nearly every day; during periods of heavy visitation, there may be two or three rangers on patrol.

Interpretation and Education. Interpretation and Education (I & E) division personnel (NPS and volunteers) are often the first and sometimes only contact visitors have with park staff. They provide wilderness information to backcountry users, help visitors complete backcountry use permits, and serve as the park's dispatch during working hours. Media, programs, and activities designed by I & E staff are the primary vehicle for increasing visitors' appreciation and understanding of wilderness. At present, most I & E staff are located in the main Visitor Center. When the situation permits, I & E personnel may staff the Frijole Ranch Museum, the McKittrick Contact Station, and the Dell City Contact Station, and may rove trails or present outdoor programs.

Boundary Fence. The entire perimeter of Guadalupe Mountains National Park is demarcated by a four-strand barbed-wire fence, which serves primarily to exclude neighboring livestock. In many places, the wilderness boundary extends to the fenced park boundary. One-quarter of the fence is assessed each year for gaps and other maintenance needs. Whenever possible, repairs are accomplished using hand tools and materials carried by mule or foot. However, major repairs occasionally require motorized support (ATV, UTV, or helicopter), when Minimum Requirements Analysis demonstrates that they cannot be accomplished using non-motorized means alone.

Intensity Level Definitions

For this environmental assessment, park staff analyzed existing and needed staffing levels and the condition and usefulness of the facilities that support operations in wilderness. Park staff knowledge was used to evaluate the impacts of each alternative. For purposes of analyzing potential impacts to park operations, the thresholds of change for the intensity of an impact are defined as follows:

Negligible - No discernable changes in park operations. Changes in operations would be within the normal range of variation.

Minor - Changes in park operations would be slight and could be covered by current seasonal employees. These may include increased backcountry patrols and exotic plant removal projects. Park staff may have to make some changes in how operations are carried out, but with a small amount of planning, training, and/or experience, these would quickly become normal.

Moderate - Changes in park operations would be apparent and likely carried out by existing permanent personnel assisted by additional seasonal employees. These may include more frequent maintenance of trails and backcountry camp sites, or additional long-term resource monitoring. Park staff would likely need additional training or a significant reassignment of priorities or duties to ensure that operations were carried out smoothly and efficiently.

Major - Changes in park operations would be significant and likely would require additional permanent staff and federal appropriations. This may include regular backcountry patrols by permanent personnel stationed on the west side of the park, or major ecological restoration projects. New operating procedures and skill sets would be required to carry out operations smoothly and efficiently.

Impacts of Alternative A - No Action

Alternative A would have negligible effects on park operations because wilderness facilities, staffing, and policies would remain unchanged. Resource management activities would occur when project funds were available, and personnel would remain at current levels. Trail and backcountry campsite maintenance would continue on the current cyclic schedule. Ranger patrols would continue with existing staff.

Cumulative Effects: Under Alternative A, park operations in GUMO wilderness are not expected to change. Past actions affecting park operations include development of the trail and backcountry campground system and construction of radio repeaters and the Pinetop patrol cabin. These facilities have been stable for more than a decade. Foreseeable future actions consist primarily of maintenance of these facilities. Cumulatively, park operations would not change appreciably when considered with other past, present, and reasonably foreseeable future actions.

Impacts of Alternative B – Emphasis on improving ecosystem integrity and wilderness character

Alternative B would have minor impacts on park operations. The primary impact would stem from the eventual removal of Pinetop Cabin with its associated caches of water and search-and-rescue equipment. The frequency with which mules would be used to carry water into wilderness in support of park projects would increase because there would be no permanent water caches. Search and rescue operations in the park high country would become more complex because personnel would have to carry water and rescue equipment that was formerly stored in the cabin. Maintenance activities would decrease slightly once the excess campsites were removed and remote trails converted to routes. Resource management activities would increase because of the emphasis on exotic species removal and active ecosystem restoration.

Cumulative Effects: Under Alternative B, park cumulative impacts to operations in GUMO wilderness would be minor. There would be less maintenance activity and more resource management activity. Patrols would be more complex because there would be a need to patrol cross-country routes and open camping zones as well as established trails, and search-and-rescue operations could be complicated by increases in off-trail use. Past actions affecting park operations include development of the trail and backcountry campground system and construction of radio repeaters and the Pinetop patrol cabin. Foreseeable future actions consist primarily of removing the excess facilities and maintenance of remaining facilities. Cumulatively, the types of park operations would change but probably not their frequency when considered with other past, present, and reasonably foreseeable future actions.

Impacts of Alternative C – Emphasis on visitor access and enjoyment

Alternative C would result in moderate impacts on park operations. Most of the impacts would result from the need to design, construct, and maintain approximately 40 miles of new trails as well as two backcountry toilets and at least six additional campsites in two new campgrounds. The frequency with which mules would be used to carry water into wilderness in support of park projects would increase because there would be no permanent water caches. The need to patrol the additional trails and facilities would require additional seasonal rangers. Maintenance of these facilities would require doubling the number of seasonal trail workers or volunteer groups.

Resource management operations would remain at current levels to control the spread of weeds and maintain basic data on the distribution and condition of flora and fauna.

Cumulative Effects: Under Alternative C, the cumulative effects on park operations in GUMO wilderness would be major. Past actions affecting park operations include development of the trail and backcountry campground system and construction of radio repeaters and the Pinetop patrol cabin. This alternative would authorize creating approximately 44 miles of trails from abandoned ranch roads (more than a 50% increase), as well as the construction of two campgrounds supplied with well water for pack stock, two backcountry toilets, and at least one hike-in campground. All of these new facilities would need to be patrolled and maintained. Resource management operations would not change appreciably, except to control weeds associated with new facilities.

Impacts of Alternative D – Protect and Restore Natural and Cultural Resources While Increasing the Range of Recreational Opportunities within Wilderness

Alternative D would result in moderate impacts on park operations. Most of the impacts would result from the need to design, construct, and maintain approximately 32 miles of new trails as well as at least six additional campsites in two new campgrounds. The frequency with which mules would be used to carry water into wilderness in support of park projects would increase because there would be no permanent water caches outside of Marcus and Pinetop. The need to patrol the additional trails and facilities would require additional seasonal rangers. Maintenance of these facilities would require additional seasonal maintenance workers and recruiting additional volunteer trail crews. Resource management activity would increase significantly because of projects to restore desert grasslands and the wildlife associated with them.

Cumulative Effects: Under Alternative D, cumulative effects on park operations would be moderate. Past actions affecting park operations include development of the trail and backcountry campground system and construction of radio repeaters and the Pinetop patrol cabin. This alternative would authorize creating approximately 32 miles of trails from abandoned ranch roads and a new trail along the eastern escarpment (an increase of about 38%), as well as the construction of two campgrounds supplied with well water for pack stock and one dry hike-in campground. All of these new facilities would need to be patrolled and maintained, by permanent or seasonal staff or by additional crews of volunteers. Resource management operations would likewise change to account for the increased emphasis on restoration and exotic species control, although much of the restoration work can be accomplished by volunteers or contractors.

Wilderness Character

Affected Environment

The Wilderness Act defines wilderness as “an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements...” In 1978, 46,850 acres of Guadalupe Mountains National Park were designated as wilderness by an act of Congress (Appendix A). In 2012, an additional 35,484 acres of park lands were deemed “eligible for wilderness study” (NPS 2012), thereby committing the NPS to managing the additional acreage as de facto wilderness. More than 95% of the park is therefore managed as wilderness. Four official entry points provide direct access to the Guadalupe Mountains Wilderness (Pine Springs, McKittrick, Dog Canyon, and Salt Basin). Three other trailheads (Frijole Ranch, Guadalupe Canyon, and Williams Ranch) provide indirect access to the wilderness.

Public lands adjacent to the park’s northern boundary and administered by the Bureau of Land Management and the USDA Forest Service as Wilderness Study Areas greatly increase the extent of

lands managed as wilderness, and also form a link to the designated wilderness within Carlsbad Caverns National Park (Table 5). Together with the 82,334 acres of designated and eligible Guadalupe Mountains Wilderness, these connected wildlands total more than 175,000 acres.

Table 5. Wilderness and Wilderness Study Areas adjacent to the Guadalupe Mountains Wilderness.

Area Name	Administered By	Acres
McKittrick Canyon WSA	BLM, Carlsbad Field Office	200
Devil's Den WSA	BLM, Carlsbad Field Office	320
Lonesome Ridge WSA	BLM, Carlsbad Field Office	3,505
Mudgetts WSA	BLM, Carlsbad Field Office	2,941
Brokeoff Mountains WSA	BLM, Las Cruces Field Office	31,606
Guadalupe Escarpment WSA	USFS, Lincoln NF, Guadalupe Ranger District	21,000
Carlsbad Caverns Wilderness	NPS, Carlsbad Caverns NP	33,125

"Wilderness character" can be defined as "the combination of biophysical, experiential, and symbolic qualities that distinguishes wilderness from all other lands" (Landres et al. 2008). It is composed of four distinct qualities, with a fifth quality unique to the Guadalupe Mountains Wilderness:

Untrammelled

This quality measures the degree to which wilderness appears to have been affected primarily by the forces of nature and is essentially free of human control or manipulation. The untrammelled quality of the Guadalupe Mountains Wilderness can be seen in the water-carved canyons, the track of a mountain lion, or in the delicate shoots of new grass emerging from a lightning charred landscape. Perpetuating the untrammelled quality requires managers to restrain themselves, rather than restraining the Wilderness. Often, upholding the untrammelled quality can detract from another Wilderness quality, such as "naturalness," or vice-versa. For example, exotic species may be removed in order to attain natural species composition, which would in turn be a manipulation of the current wilderness.

The primary actions that degrade the untrammelled quality in the Guadalupe Mountains Wilderness include removal of exotic species, native plant revegetation, and the prescription and suppression of fire. Although no species are being reintroduced at present, the reintroduction of bighorn sheep remains a possibility. Efforts to eradicate Barbary sheep, feral hogs, mullein, Russian thistle, and horehound, among other non-native species, are ongoing in the wilderness. Fuel reduction activities (e.g., prescribed fire) are considered trammeling, as are the actions taken to suppress wildfires. On the other hand, these activities enhance the natural quality of wilderness by restoring a more complete range of species and ecological conditions.

The park is gradually removing all of the interior fences (posts, gates, and barbed and woven wire) that remain from ranching operations. The fences have been determined not to be of historic significance and are being removed to improve the Untrammelled and Undeveloped qualities of wilderness character as well as to improve wildlife habitat and visitor safety. While the tearing down of the fences is accomplished manually, removal of fence material from the park has been accomplished using helicopters under a Minimum Requirements Analysis document.

Natural

This quality measures the degree to which wilderness ecosystems are functioning, intact, and are substantially free of the effects of modern civilization. The extraordinary landscape and variety of ecological systems creates a unique natural character in the Guadalupe Mountains Wilderness.

Guadalupe Mountains Wilderness provides opportunities for visitors to experience a tremendous diversity of landscapes, plant and animal life as well as outstanding cultural and geologic features. The natural quality of the Guadalupe Mountains Wilderness has been affected by internal and external forces that threaten the flora and fauna, visual conditions, and nutrient cycling. Cumulatively, such influences compromise somewhat the natural integrity of the Wilderness.

A variety of species within the park are listed as rare or endangered, such as the Mexican spotted owl, and most of the vegetation communities are still recovering from the effects of livestock grazing. Some animals that once were present in the park have been extirpated, such as the bighorn sheep and Mexican gray wolf. Several invasive species have been introduced, modifying natural species composition. Although air quality within the park is relatively good, vehicles and surrounding agricultural and industrial activity can cause pollutants including fine particulates, ozone, and sulfur and nitrogen compounds to be transported into the park. Other external disturbances include light and noise, primarily from surrounding urban areas, the highway, petroleum exploration operations, and commercial air traffic.

Although the biophysical environment and overall integrity of the Guadalupe Mountains Wilderness have suffered from some external and internal degradation, the system remains a rare haven of diversity and complexity. Ongoing efforts to reintroduce extirpated species, remove exotic species, and the positive effects of visitor education are helping to reinstate natural conditions, while ongoing research is increasing understanding of overall ecologic and geologic processes.

Undeveloped

This quality measures the degree to which wilderness retains primeval influences and the “hand of man is substantially unnoticeable.” The remoteness of the Guadalupe Mountains Wilderness exemplifies the undeveloped quality. Visitors are attracted by the relatively unobstructed views, both into the park from the surrounding Chihuahuan Desert, as well as from the mountain peaks outward. Distance from neighboring towns provides an excellent vantage point from which to view impressive night skies, and remote canyons harbor little evidence of human presence.

Several areas within the Wilderness do, however, contain modern developments that detract from the undeveloped character. The patrol cabin at Pinetop was installed for administrative use and visitor safety. Radio repeaters and a RAWS fire weather station exist within the wilderness, although they are critical for ensuring safety. Large metal water tanks and pipelines constructed by settlers for storing and distributing water for livestock exist in the Bowl and scattered across the Salt Basin. Hunter Line Shack, while clearly a development, is a reminder of the area’s ranching history and is eligible for inclusion on the National Register, rendering it appropriate within wilderness. Other historical remnants include earthen stock tanks throughout the park, mine adits in Dog Canyon, dirt roads, windmills, and an oil well in the Salt Basin. Interior livestock fencing is in the process of being removed from the wilderness, as it has already been determined to have no particular historic significance. A small number of scientific equipment installations exist within wilderness, although these are carefully located so as to be invisible to the casual observer.

Opportunities for Solitude and Primitive, Unconfined Recreation

This quality measures the degree to which visitors to wilderness have the opportunity to experience solitude and self-discovery. The abundance of opportunities for solitude and primitive recreation is a fundamental characteristic of the Guadalupe Mountains Wilderness. The views of endless sky and

impossibly distant horizons, secluded canyons, and secret springs elicit a liberating isolation from the urban world. Numerous trails and sites for hiking, backpacking, camping, horseback riding, sightseeing, nature study, and bird watching provide visitors with outstanding options to relax or challenge themselves away from crowds.

Developments associated with recreational activities are considered an impediment to solitude because they signify human presence. At all campsites, treated wooden poles delineate designated tent pads. The existence of these pads, while detracting from one's sense of solitude, also protect surrounding vegetation and provide some of the only clear, flat places to pitch a tent within the park. Throughout the trail system, signs distinguish campsites and provide direction at trailheads, as well as warning visitors of sensitive environments. Paradoxically, the relative remoteness of and low visitation to the Wilderness enhance the opportunity for solitude.

Outstanding recreational opportunities exist within the Guadalupe Mountains Wilderness. Visitors can hike an extensive trail system and in most places explore what lies beyond them. Several restrictions, however, confine visitor opportunities for recreation somewhat. Limiting some trails to hikers only, designating campsites, discouraging use of the existing open camping area, and allowing only day use of McKittrick Canyon, along with prohibitions of visitor actions such as lighting a campfire, diminish the unconfined quality of wilderness..

Unique geological and paleontological legacy

The Guadalupe Mountains wilderness contains the best and most intact example of a Permian reef, with a rich diversity of fossils and all of its associated structures and stratigraphy intact.

Wilderness Character Monitoring

Although humans have left their imprint on the Guadalupe Mountains landscape for thousands of years, these impacts are difficult for most visitors to discern and in general the landscape appears to be substantially unaltered by humans. If each of the four main qualities of wilderness character (Untrammled, Natural, Undeveloped, Solitude) is visualized as a continuum from pristine to urbanized, the Guadalupe Mountains Wilderness would occupy an area closer to pristine than urbanized, but with room for improvement because of the impacts of 20th century ranching. The primary goal of wilderness stewardship is to ensure that the qualities of wilderness character remain constant or improve as a result of management actions.

The qualities of wilderness character are difficult to quantify or to monitor trends directly; therefore Guadalupe Mountains National Park has developed a monitoring system that measures and tracks the qualities of wilderness character indirectly (Mills 2010, Appendix B). For example, trends in the Undeveloped quality of wilderness are monitored (in part) by counting the number of Minimum Requirements Analysis documents that permit motorized uses or installations of scientific instruments in wilderness each year.

Intensity Level Definitions

Negligible - A change in the wilderness character could occur, but it would be so small or of such short duration that it would not be of any measurable or perceptible consequence.

Minor - A change in the wilderness character and associated values would occur, but it would be small and, if measurable, would be highly localized or relatively short in duration.

Moderate - A change in the wilderness character and associated values would occur. It would be measurable, but localized and might be of moderate duration (up to a year).

Major - A noticeable change in the wilderness character and associated values would occur. It would be measurable, and would have substantial or possibly permanent consequences.

Impacts of Alternative A – No Action

Under Alternative A, there would be negligible overall impact to or improvement in wilderness character in the Guadalupe Mountains Wilderness. The Untrammelled quality would continue to be affected by park management of exotic species and fire. The Undeveloped quality will improve slightly as interior fencing is removed, although it will continue to be impacted by other remnants of the area's ranching history such as water tanks and windmills. The Natural quality will continue to be affected by the presence of exotic species such as Barbary sheep and Lehmann's lovegrass, as well as by the absence of extirpated species such as Aplomado falcon, Mexican wolf, and Guadalupe fescue. The quality of Solitude and Unconfined Recreation would continue to be diminished by the fact that backcountry users are limited in where they can camp and by the fact that most use is concentrated on a few trails and within a few miles of the Pine Springs trailhead.

Cumulative Effects: Alternative A prescribes continuing current wilderness policies and maintaining current facilities, with little additional impact to the qualities of wilderness character. Past, current, and reasonably foreseeable actions that may impact wilderness character include small installations for research or management purposes (such as stream flow gauges or wildlife cameras), prescribed fires to bring the montane woodlands back into the range of natural variation, small projects to remove exotic species from specific areas, and the ongoing project to remove interior fences. Cumulative effects on wilderness character would be minor, as nearly all of this activity (except fire and fence removal) would be undetectable by the average wilderness visitor.

Impacts of Alternative B – Emphasis on improving ecosystem integrity and wilderness character

Under Alternative B, there would be moderate improvement in most of the qualities of wilderness character in the Guadalupe Mountains Wilderness. Impacts to the Untrammelled quality would increase because of the increased emphasis on actions to restore ecosystem integrity, which include prescribed fire and aggressive exotic species removal. The Undeveloped quality would improve moderately as most historic ranching artifacts would be removed, although it would take many years to accomplish this. The Natural quality would improve moderately due to efforts to reduce or eliminate exotic species such as Barbary sheep and Lehmann's lovegrass, as well as actions to reintroduce or support rare species such as Guadalupe fescue and Montezuma quail. The quality of Solitude and Unconfined Recreation would improve because of the increased emphasis on off-trail hiking and camping, and the increase in area available for recreation because of the opening of the Salt Basin to visitors.

Cumulative Effects: Alternative B would implement significant changes in wilderness policies and management with major (beneficial) impacts to the qualities of wilderness character. In addition to the small cumulative impacts described under Alternative A, past, current, and reasonably foreseeable actions that may impact wilderness character include removing up to 18 campsites, increases in resource and fire management activity, and removal of most evidence of historic ranching. Cumulative effects on wilderness character would be moderate, as much of it would be evident to the average wilderness visitor, although in the long run the effects would be largely beneficial to wilderness character.

Impacts of Alternative C – Emphasis on visitor access and enjoyment

Under Alternative C, all of the qualities of wilderness character would maintain or decline slightly, except for Solitude and Unconfined Recreation, which would improve. The Untrammelled quality would continue to be affected by park management of exotic species and fire. The Undeveloped quality will improve slightly as interior fencing is removed, although it will continue to be impacted by other remnants of the area's ranching history such as water tanks and windmills, as well as the development of toilets and additional trails and campgrounds. The Natural quality will continue to

be affected by the presence of exotic species such as Barbary sheep and Lehmann's lovegrass, as well as by the absence of extirpated species such as Merriam's turkeys, Mexican wolf, and Guadalupe fescue. The quality of Solitude and Unconfined Recreation would improve because of the increased area of open camping and because backcountry users would spread out over more of the wilderness in the Salt Basin. Impacts to wilderness character under this alternative are minor.

Cumulative Effects: Alternative C would implement significant changes in wilderness policies and management. In addition to the small cumulative impacts described under Alternative A, past, current, and reasonably foreseeable actions that may impact wilderness character include development of more than 40 miles of new trails, three new campgrounds, new routes, and two backcountry toilets. These impacts would be spread over a large area, but they would be noticeable. The cumulative effect of Alternative C on wilderness character is moderate.

Impacts of Alternative D – Protect and Restore Natural and Cultural Resources While Increasing the Range of Recreational Opportunities within Wilderness

Under Alternative D, the qualities of wilderness character would experience variable impacts, although all impacts would be minor. Impacts to the Untrammeled quality would increase because of the increased emphasis on actions to restore ecosystem integrity, which include prescribed fire and aggressive exotic species removal. The Undeveloped quality would improve slightly as some historic ranching artifacts would be removed, although it would take many years to accomplish this. The Natural quality would improve moderately due to efforts to reduce or eliminate exotic species such as Barbary sheep and Lehmann's lovegrass, as well as actions to reintroduce or support rare species such as Guadalupe fescue and Montezuma quail. The quality of Solitude and Unconfined Recreation would improve because use would be spread out on the additional 38 miles of trails for hikers to explore, most of which are less strenuous than the existing trail system. It would continue to be impacted by the restriction of most camping to designated areas, although the areas where dispersed camping is allowed would increase somewhat.

Cumulative Effects: Alternative D would implement noticeable changes in wilderness policies and management. In addition to the cumulative impacts described under Alternative A, past, current, and reasonably foreseeable actions that may impact wilderness character include increases in resource and fire management activity, development of more than 30 miles of new trails, and three new campgrounds. These impacts would be spread over a large area, but they would be noticeable. The cumulative effect of Alternative D on wilderness character is moderate.

Biotic Resources

Affected Environment

Management Policies 2006 states that the Service "will maintain as parts of the natural ecosystems of parks all plants and animals native to park ecosystems. The Service will successfully maintain native plants and animals by minimizing human impacts on native plants, animals, populations, communities, and ecosystems, and the processes that sustain them" (NPS 2006).

Guadalupe Mountains National Park has a high level of biodiversity relative to its size. The diversity of desert, foothills, and montane environments ranging over more than 5000 feet of elevation are home to thousands of species with Rocky Mountain, Southern Plains, and Chihuahuan Desert affinities (Table 6). The vegetation communities supporting these species are likewise diverse, from salt desert basins to montane mixed conifer forest and deciduous riparian woodland (Table 7).

Table 6. Diversity by major taxonomic group of species confirmed within Guadalupe Mountains National Park. Because 95% of the park is managed as wilderness, nearly all of these species occur in wilderness. Except for a few groups (e.g., moths, scorpions), invertebrates are poorly documented in the park and are not included in this table.

Major Taxonomic Group	Number of Taxa In GUMO
Mammals	70
Birds	309 (94 breeding)
Fish	3
Amphibians	9
Reptiles	45
Vascular Plants	1024
Fungi	65

The park is in a vegetative transition zone where Chihuahuan Desert, Rocky Mountain, and Great Plains species overlap, and some are at or near their geographic limits. The mountains form a biological “island” surrounded by the northern Chihuahuan Desert and provides a setting for diverse ecological communities. More than 1,000 species of plants and 400 species of vertebrates have been recorded in the park. Of these, 16 are endemic to the Guadalupe Mountains.

Determined by elevation and exposure, vegetation types in Guadalupe Mountains National Park include desertscrub, grasslands, chaparral, woodlands, and coniferous forest. Striking desert succulents and high-country conifers are all part of the park’s appeal. The canyons’ autumn color displays by western hophornbeam and bigtooth maple are especially attractive to visitors.

The characteristics of the major vegetation communities in the park are summarized below from higher elevations to lower. The Vegetation Types map (Figure 9) illustrates the distribution of these plant communities within the park (NatureServe 2014) and Table 7 gives the approximate extent of each community.

Arid West Emergent Marsh. This rare, low-elevation vegetation type is especially important for wildlife, as it provides water, shelter, and forage for many species. It typically occurs in very small areas in canyon bottoms and alluvial fans where groundwater seepage encounters a nearly level slope, allowing the water to spread out and pool. Dominant species are those typical of saturated, alkaline soils, including sedges and rushes, sawgrass, bulrush and cattails. These wetlands are home to longear and green sunfish and a diversity of dragonflies.

Chihuahuan Creosotebush-Mixed Desert Scrub. This type dominates gravelly alluvial fans below the western escarpment. Stands on valley floors represent desert grasslands degraded by overgrazing. The shrub canopy is strongly dominated by creosote bush with tarbush. Other shrubs may include lechuguilla, mariola, leatherstem, ocotillo, crown-of-thorns, wolfberry, and yucca. In general, diversity is low. Herbaceous cover is usually low and composed primarily of grasses such as black grama, fluffgrass, tobosa, and alkali sacaton. The rare Texas horned lizard is regularly found in mixed desert scrub.

Chihuahuan Gypsophilous Shrubland & Grassland. This unusual vegetation type is also identified as a “priority habitat” for conservation and restoration by the Texas Parks and Wildlife Department

(TPWD 2012). It is restricted to the floor of the Salt Basin and occupies gypsum flats and dunes derived from adjacent playa lake margins. Unusual botanical assemblages and hardy wildlife species endure the harsh conditions. The most common plants include sand bluestem, broom pea, rosemary mint, soap tree yucca, and gyp grama. Rare or unusual species include gyp moonpod, shy mentzelia, and gypsum scalebroom.

Chihuahuan Semi-Desert Grassland. Only remnants of this type persist. It is identified as a "priority habitat" for conservation and restoration by the Texas Parks and Wildlife Department (TPWD 2012). Stands of black grama, blue grama, muhly, and needlegrass occur in the park on alluvial fans below the escarpments. With the cessation of livestock grazing, these grasslands are slowly recovering and now dominate slopes burned by the Marcus and Cutoff fires. Scattered shrubs may include creosotebush, mariola, skeleton-leaf golden eye, whitethorn acacia, catclaw mimosa, javelina bush, and many others. This community is home to many wildlife species in decline or that have been extirpated from the park, such as pronghorn antelope, Merriam's turkey, Montezuma quail, and Aplomado falcon.

Madrean Encinal. This vegetation type occurs on lower canyon slopes and adjacent to drainages cutting through the alluvial fans of the eastern escarpment. Stands are typically open woodlands with gray and Mexican blue oaks, Texas madrone, pinyon pine and alligator juniper. Mountain mahogany, bitterbrush, and scrub oaks may be present and can dominate where this type has been overgrazed. Otherwise, warm-season grasses typically fill spaces between the trees, including threeawn, lovegrass, and sprangletop. Montezuma quail use this community to nest and forage.

Madrean Lower Montane Pine-Oak Forest & Woodland. This system occurs at higher elevations of the Guadalupe Mountains. It is typically dominated by ponderosa pine, but oak species such as gray oak, wavyleaf oak, and Gambel oak may be present to codominant. The subcanopy and shrub layer are typically not dense and may include species of the canopy as well as alligator juniper, mountain mahogany, snowberry, sacahuista, and catclaw mimosa. Pinyon pine becomes a common component in drier stands. The herbaceous layer is typically dominated by a diverse community of grasses. This community provides important habitat for mule deer, especially in summer.

Madrean Oak-Mountain Mahogany-Mixed Foothill Shrubland. This diverse shrubland type occupies cooler sites on upper alluvial fans, lower canyon slopes, and foothills throughout the park. The shrub canopy includes up to a dozen species, including mountain mahogany, threeleaf sumac, gray oak, wavyleaf oak, buckbrush, and sotols. This dense vegetation is important for wildlife habitat, especially mule deer, and for watershed protection.

Madrean Pinyon-Juniper Woodland. Pinyon-juniper woodlands occur on dry slopes above 5,000 feet elevation. The canopy consistently includes pinyon pine with one or more of one-seed juniper, alligator juniper, Rocky Mountain juniper, and gray oak. The woodland understory may be dominated by shrubs (such as mountain mahogany or catclaw mimosa) or by grasses (such as finestem needlegrass and pinyon ricegrass), depending on aspect, soil moisture conditions, grazing history, and fire history. Along their lower margins, pinyon-juniper woodlands mix with mountain grasslands and shrublands. At the upper limits, they can reach the forests of ponderosa pine. Pinyon jays, porcupine, and mule deer are common species of this community and it is also home to the federally listed Mexican spotted owl.

Madrean Upper Montane Broadleaf Forest & Woodland. This minor vegetation type occurs in scattered, isolated patches on higher elevation stream terraces, around springs, and in canyon heads, especially in McKittrick Canyon and other deep, cool canyons. These canyons are a popular attraction during autumn when the maples, oaks, and other deciduous trees turn vibrant colors. Western hophornbeam, bigtooth maple, and chinkapin oak are the dominant canopy species.

Species of interest include the possibly extirpated Guadalupe fescue and Chapline's columbine. Many of the park's nesting birds use this community.

Madrean Upper Montane Conifer-Oak Forest & Woodland. This vegetation type is restricted to cool slopes and canyon heads above 7,000 feet elevation. It represents an isolated occurrence of Rocky Mountain coniferous forest and one of the few in the Chihuahuan Desert north of Mexico. Douglas-fir, southwestern white pine, and ponderosa pine are the dominant trees. Gambel oak and southwestern chokecherry are scattered throughout and a relict stand of quaking aspen persists on a sheltered, north-facing slope. The herbaceous layer is typically dominated by bunchgrasses. Black bear, mountain lion, sharp-shinned hawk, and Steller's jay are characteristic wildlife of this community.

North American Warm Semi-Desert Cliff, Scree & Rock Vegetation. Sparse, hardy vegetation occupies cliff bands on both escarpments as well as in the larger canyons. These areas are protected from the direct effects of fire and include species from the surrounding communities. Plants root in cracks in the rock or in soil pockets among scree boulders. Many of the park's rare plants, such as McKittrick pennyroyal, occur in this community. Rock squirrels and peregrine falcon make use of scree and cliff habitats, respectively.

Sonoran-Chihuahuan Lowland Riparian Forest Group. Deciduous trees grow near springs or along intermittent drainages where the water table is generally within a few feet of the surface. Little walnut and velvet ash occur at the mouths of canyons and Texas madrones provide an evergreen contrast. These communities provide winter cover for resident birds and mule deer.

Warm Semi-Desert Shrub & Herb Wash-Arroyo. This sparse shrubland type occurs in ephemerally flooded washes. The vegetation is characterized by species that are tolerant of the physical damage caused by flash floods, especially Apache plume. The herbaceous layer is typically sparse and most consistent species are grasses, including black and hairy grama. Desert cottontail shelter among the shrubs and many animals use these arroyos as travel corridors.

Intensity Level Definitions

Negligible - An action that could result in a change to the composition, structure, or function of the vegetation community, but the change would be so small or temporary that it would not be of any measurable or lasting consequence. For example, trimming back shrubs overhanging a trail generates a negligible impact.

Minor - An action that could result in a change to the composition, structure, or function of the vegetation community. The change would be small or localized and of little consequence. Clearing an 8 x 8 foot pad for a designated campsite is a minor impact.

Moderate - An action that would result in some change to the composition, structure, or function of the vegetation community. The change would be measurable and of consequence to the species or resource but relatively localized. Removing the conifer trees from a stand of aspen to help the aspen regenerate would be a moderate impact.

Major - An action that would result in a noticeable change to the composition, structure, or function of the vegetation community. The change would be measurable and would result in a severe adverse or major beneficial impact and a possible permanent consequence to the community, such as a type conversion. A wildfire can create a major impact to a vegetation community, as can the use of broadcast herbicides to remove shrubs as part of an ecological restoration project.

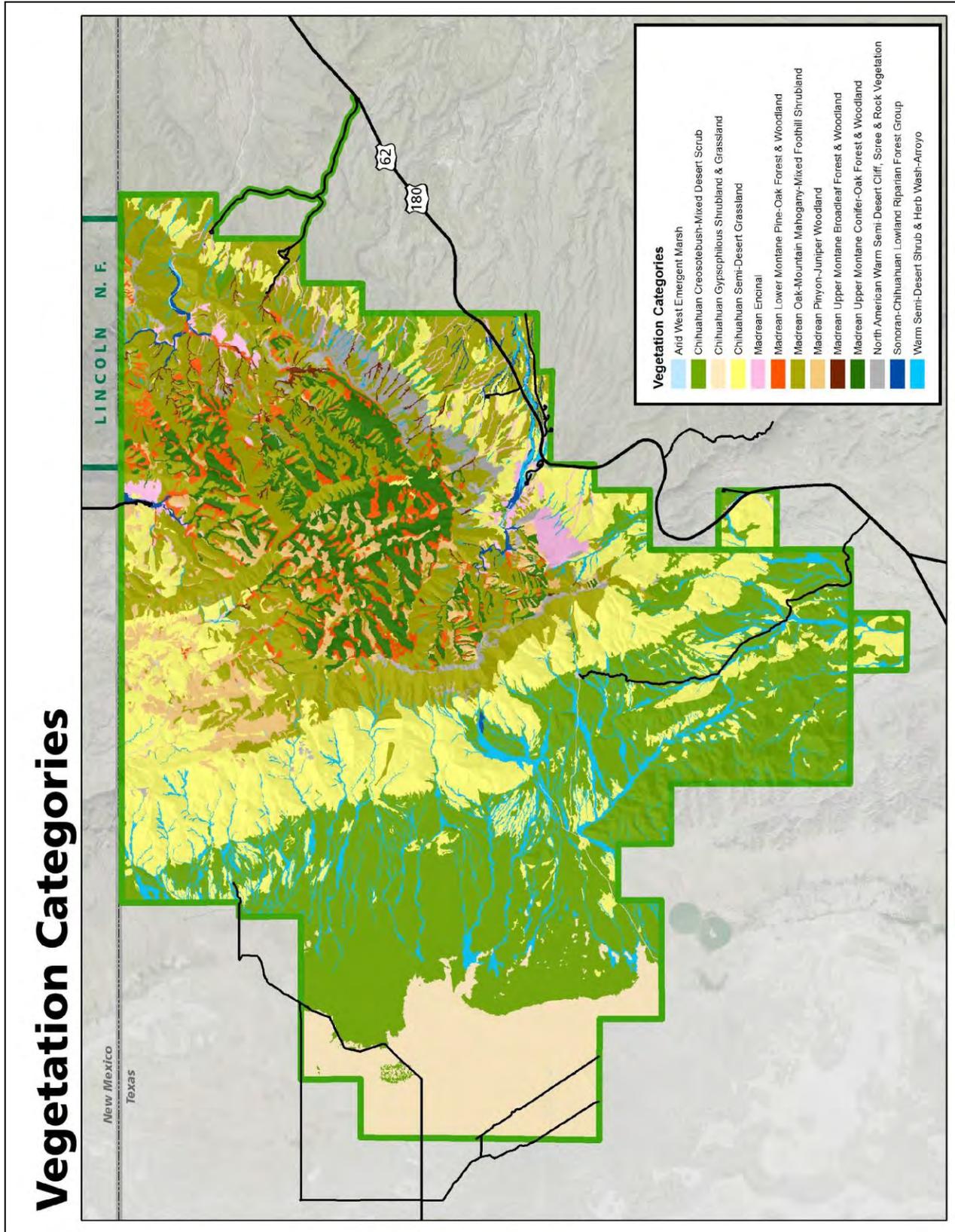


Figure 9. Draft vegetation map for Guadalupe Mountains National Park (Muldavin et al. in prep.)

Table 7. Approximate extent of the major vegetation types within Guadalupe Mountains National Park. Data are from the draft vegetation map by Muldavin (in prep). This map has not been assessed for accuracy.

Vegetation Type	Acres
Arid West Emergent Marsh	15
Chihuahuan Creosotebush-Mixed Desert Scrub	23,250
Chihuahuan Semi-Desert Grassland	18,000
Chihuahuan Gypsophilous Shrubland & Grassland	7,500
Madrean Encinal	1,550
Madrean Lower Montane Pine-Oak Forest & Woodland	2,250
Madrean Oak-Mountain Mahogany-Mixed Foothill Shrubland	17,700
Madrean Pinyon-Juniper Woodland	3,500
Madrean Upper Montane Broadleaf Forest & Woodland	450
Madrean Upper Montane Conifer-Oak Forest & Woodland	5,325
North American Warm Semi-Desert Cliff, Scree & Rock Vegetation	1,675
Sonoran-Chihuahuan Lowland Riparian Forest Group	450
Warm Semi-Desert Shrub & Herb Wash-Arroyo	4,750

Impacts of Alternative A – No Action

Under Alternative A there would be negligible impacts to the park's biota. Most of the negative impacts to vegetation occurred before the park was established, as a result of livestock ranching and fire suppression. Fire suppression began in the early 20th century, with the result that woodlands in the high country are ten times as dense as they were previously (Sakulich and Taylor 2007). In the 40 years since the park opened, the native bunchgrass element of all communities has rebounded except in the Salt Basin. In the Salt Basin, grazing converted most of the desert grasslands to mesquite and creosote bush shrublands; these communities will not recover without active intervention to kill the shrub layer and reintroduce native grasses. Alternative A does not include specific actions either to restore grasslands or to thin the montane woodlands, so that existing plant communities would persist. There would likewise be no effort made to improve habitat for or reintroduce declining species such as Montezuma quail or pronghorn antelope. Exotic species would be limited in their spread, but there would not be particular effort to eradicate or reduce the species with the greatest ecological impact.

Cumulative Effects: Under this alternative the cumulative effects would be negligible. Impacts to biota resulting from previous recreational development (10 campgrounds and 84 miles of trails) have recovered in the decades since they were installed. Except for salt cedar, which has been extirpated, exotic species have been limited in their numbers and spread but not eliminated. The fact that no new facilities would be developed and that the Salt Basin would remain largely inaccessible would likewise limit impacts.

Impacts of Alternative B – Emphasis on improving ecosystem integrity and wilderness character

Under this alternative, the impacts to biotic resources would be major. Most of the impacts would be associated with habitat and species restoration and would therefore be beneficial. Up to 10,000 acres of creosote-mesquite scrub would be restored to Chihuahuan Desert and foothills grasslands and a fire-resilient structure would be established and maintained in up to 4000 acres of montane forest. Once habitat is established, species reintroductions could commence, although some, such as reintroduction of desert bighorn sheep, would require the additional step of eliminating existing populations of exotic Barbary sheep. These activities, as well as removing roads and structures associated with the area's ranching history, could create moderate short-term impacts if machinery and/or helicopters are determined to be the minimum tool to effect the restoration and reintroductions. This work is likely to be spread over many years, so that the impact at any one time may be less.

Cumulative Effects: Under this alternative, the cumulative effects would be major. Impacts to the park's biota from previous actions such as installing the existing trail and campground system and removing non-historic structures, have largely recovered. Because of the acreage involved and the need to remove large amounts of existing vegetation such as creosote bush scrub and forest undergrowth, the habitat restoration and species reintroduction projects proposed under this alternative would have the major biological impacts described above, although these would be beneficial in the long run.

Impacts of Alternative C – Emphasis on visitor access and enjoyment

This alternative would have moderate adverse impacts to the park's plants and animals. Most of the impact would be associated with the development of new facilities such as trails and campgrounds. Expanding human presence in the west side may well disrupt some animal nesting or burrowing near these developments, but the relatively small area that will be disturbed will limit the overall impact. There would be no impacts associated with ecosystem restoration, as this activity would not occur. There would be an increased opportunity for exotic plants to be introduced, especially in the Salt Basin, but the extent of this impact is impossible to measure.

Cumulative Effects: Under this alternative, approximately two acres of ground would be disturbed and native vegetation removed in order to add campsites and to construct new trails and campgrounds, although the impact is limited somewhat by the fact that the trails would largely follow existing roads and campgrounds would be constructed in areas previously disturbed by concentrations of livestock or illegal camping. Impacts to biota resulting from previous recreational development (campgrounds and trails) have recovered in the decades since they were installed. The cumulative impacts under this alternative are moderate.

Impacts of Alternative D – Protect and Restore Natural and Cultural Resources While Increasing the Range of Recreational Opportunities within Wilderness

Impacts to the park's biota under this alternative are moderate. Impacts resulting from restoration of grasslands would be beneficial, although there may be temporary negative impacts if aircraft or heavy machinery are determined to be the minimum tool to effect physical site restoration. Of the 38 miles of new trails and the new campgrounds, more than half would be constructed in existing roads and disturbed areas. Expanding human presence in the west side may well disrupt some animal nesting or burrowing near these developments, but the relatively small area that will be disturbed will limit the overall impact. There would be an increased opportunity for exotic plants to be introduced, especially in the Salt Basin, but the extent of this impact is impossible to measure, and would be largely counteracted by the increase in efforts to control and remove exotic species.

Cumulative Effects: Under this alternative, approximately one acre of ground would be disturbed and native vegetation removed in order to construct trails and campgrounds, although the impact is limited by the fact that most trails would follow existing roads and campgrounds would be constructed in areas disturbed by concentrations of livestock. Impacts to biota resulting from previous recreational development (campgrounds and trails) have recovered in the decades since they were installed. Impacts associated with grassland and species restoration would be temporary and beneficial in the long run. The cumulative impacts under this alternative are moderate.

Special Status Species

Affected Environment

A number of taxa reach the limit of their distribution in the park, or are rare across their range, or are endemic to the park and its immediate surroundings (Table 8a). Each of these categories of species receives special consideration in the way the park manages wilderness. Extirpated species (Table 8b) may be candidates for reintroduction under some alternatives.

Table 8a. Federal and state (NM and TX) species of concern reported to occur in the designated or eligible wilderness areas of Guadalupe Mountains National Park.

Common Name	Scientific Name	Status		
		Federal	TX	NM
Vascular Plants				
Guadalupe Mtns columbine	<i>Aquilegia chrysantha chaplinei</i>		SOC	SOC
Gyp locoweed	<i>Astragalus gypsodes</i>			SOC
Mat leastdaisy	<i>Chaetopappa hersheyi</i>		SOC	SOC
Guadalupe mountain laurel	<i>Dermatophyllum guadalupense</i>		SOC	SOC
Guadalupe rabbitbrush	<i>Ericameria nauseosa texensis</i>		SOC	SOC
Guadalupe pincushion cactus	<i>Escobaria guadalupensis</i>		SOC	SOC
McKittrick pennyroyal	<i>Hedeoma apiculata</i>	Delisted	SOC	SOC
Chisos coral-root	<i>Hexalectris revoluta</i>		SOC	SOC
Warnock's coral-root	<i>Hexalectris warnockii</i>		SOC	
Gypsum scalebroom	<i>Lepidospartum burgessii</i>		SOC	SE
Scaly bladderpod	<i>Lesquerella valida</i>		SOC	
Yellowseed nama	<i>Nama xylopodum</i>			SOC
Sand sacahuista	<i>Nolina arenicola</i>		SOC	
Cardinal penstemon	<i>Penstemon cardinalis regalis</i>		SOC	SOC
Five-flowered rockdaisy	<i>Perityle quinqueflora</i>			SOC
Dwarf rock lettuce	<i>Pinaropappus parvus</i>		SOC	
Milkwort	<i>Polygala rimulicola</i>		SOC	SOC
Watson's false clappia-bush	<i>Pseudoclappia watsonii</i>			
Mountain sage	<i>Salvia summa</i>		SOC	SOC
Few-flowered jewelflower	<i>Streptanthus sparsiflorus</i>		SOC	SOC
Texas valerian	<i>Valeriana texana</i>		SOC	SOC
No common name	<i>Viola calcicola</i>		SOC	SOC

Common Name	Scientific Name	Status		
		Federal	TX	NM
Guadalupe Mountains violet	<i>Viola guadalupensis</i>		SOC	

Invertebrates

Guadalupe cave pseudoscorpion	<i>Archeolarca guadalupensis</i>		SOC	
Poling's hairstreak	<i>Fixsenia polingi</i>		SOC	
Guadalupe Mtns tiger beetle	<i>Cicindela politula petrophila</i>		SOC	
Northern threeband	<i>Humboldtiana ultima</i>		SOC	

Reptiles

Texas horned lizard	<i>Phrynosoma cornutum</i>		ST	
Hernandez' horned lizard	<i>Phrynosoma hernandesi</i>		ST	

Birds

Western burrowing owl	<i>Athene cunicularia hypugaea</i>		SOC	SOC
Zone-tailed hawk	<i>Buteo albonotatus</i>		ST	
Ferruginous hawk	<i>Buteo regalis</i>		SOC	
Common black-hawk	<i>Buteogallus anthracinus</i>		ST	SOC
Bald eagle	<i>Haliaeetus leucocephalus</i>		SOC	ST
Yellow billed cuckoo	<i>Coccyzus americanus occidentalis</i>	Threatened	SOC	SOC
Montezuma quail	<i>Cyrtonyx montezumae</i>		SOC	SOC
Peregrine falcon	<i>Falco peregrinus</i>	Delisted	ST	ST
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened	ST	SOC

Mammals

Townsend's big-eared bat	<i>Corynorhinus townsendii</i>		SOC	
Western small-footed bat	<i>Myotis ciliolabrum</i>		SOC	
Fringed myotis	<i>Myotis thysanodes</i>		SOC	
Cave myotis	<i>Myotis velifer</i>		SOC	
Long-legged myotis	<i>Myotis volans</i>		SOC	
Big free-tailed bat	<i>Nyctinomops macrotis</i>		SOC	
Gray-footed chipmunk	<i>Tamias canipes</i>		SOC	
Guad. southern pocket gopher	<i>Thomomys bottae guadalupensis</i>		SOC	SOC
Pronghorn antelope	<i>Antilocapra americana</i>		SOC	SOC
Black bear	<i>Ursus americanus</i>		ST	ST

FT= federally listed-Threatened; FC=candidate for federal listing; SE=State-listed Endangered; ST=State-listed Threatened; SOC=state species of concern

The Texas Parks and Wildlife Department has developed a statewide Conservation Action Plan (TPWD 2012). This plan identifies species of greatest conservation need, the specific threats they face, and the habitats crucial for their persistence (Tables 8a and b, Table 9). The document also recommends particular actions to assist in species conservation, such as controlling competing exotic plants or animals, avoiding populations during construction, evaluating impacts of existing trails, and restoring native desert grasslands.

Table 5b. Federal and state (NM and TX) species of concern formally occurring but now believed or known to be extirpated from Guadalupe Mountains National Park.

Common Name	Scientific Name	Status		
		Federal	TX	NM
Vascular Plants				
Guadalupe fescue	<i>Festuca ligulata</i>	Candidate	SOC	
Fish				
Rio Grande cutthroat trout	<i>Oncorhynchus clarki virginalis</i>			SOC
Birds				
Aplomado falcon	<i>Falco femoralis septentrionalis</i>	Endangered	SE	SOC
Mammals				
Mexican gray wolf	<i>Canis lupus baileyi</i>	Endangered	SE	SOC
Desert bighorn sheep	<i>Ovis canadensis nelsoni</i>		SOC	SOC
Black-tailed prairie dog	<i>Cynomys ludovicianus</i>		SOC	SOC

SE=State-listed Endangered; SOC=state species of concern

Table 9. Texas Parks and Wildlife Department Priority Habitats occurring within the Guadalupe Mountains wilderness. (TPWD 2012).

GUMO Vegetation Type (Figure 4)	Specific Habitats	Species of Greatest Conservation Need
North American Warm Semi-Desert Cliff, Scree & Rock Vegetation	Cliffs and rock outcrops Cliff faces, talus slopes, and rock-dominated canyons Dunes Gypsum habitats	McKittrick pennyroyal Gypsum scalebroom Guadalupe Mountains violet Peregrine falcon Guadalupe Mtns tiger beetle
Chihuahuan Semi-desert Grassland	Montane grasslands Non-montane semi-arid grasslands	Western burrowing owl Aplomado falcon Pronghorn antelope
Chihuahuan Creosotebush-Mixed Desert Scrub, Chihuahuan Gypsophilous Shrubland & Grassland	No specific habitats identified in this category; however, several rare plants, embedded wetland communities, and wide-ranging mammals dependent on these habitat types.	Texas horned lizard Guadalupe pincushion cactus Guadalupe mesquite bean
Madrean Oak-Mountain Mahogany-Mixed Foothill Shrubland	Montane foothill shrublands Arroyo canyon shrubland Sky Island foothill slope shrublands	Montezuma quail Poling's hairstreak butterfly
Madrean Encinal, Madrean Pinyon-Juniper Woodland	Ponderosa pine woodlands Woody mottes punctuating open grasslands	Montezuma quail
Madrean Lower Montane Pine-Oak Forest & Woodland	Mixed oak – pine and oak – juniper woodlands Montane woodlands Canyon woodlands	Mexican spotted owl
Madrean Upper Montane Conifer-Oak Forest & Woodland	Closed canopy pine forests Montane forests Canyon forests	Black bear Gray footed chipmunk

GUMO Vegetation Type (Figure 4)	Specific Habitats	Species of Greatest Conservation Need
Sonoran-Chihuahuan Lowland Riparian Forest Group , Warm Semi-Desert Shrub & Herb Wash-Arroyo	Periodically flooded or subirrigated floodplains, tributary ravines and creekside vegetation in McKittrick Canyon, Guadalupe Canyon	Mexican spotted owl Guadalupe Mtns columbine
Arid West Emergent Marsh	Instream habitats of McKittrick Creek Springs, seeps Swale depression wetlands	Rio Grande cutthroat trout Springsnails

NPS Management Policies (NPS 2006) requires that the Service strive to protect and preserve species of both federal and state concern. Section 4.4.2.3 of Management Policies 2006 states, "The Service will survey for, protect, and strive to recover all species native to national park system units that are listed under the Endangered Species Act. The Service will fully meet its obligations under the NPS Organic Act and the Endangered Species Act to both proactively conserve listed species and prevent detrimental effects on these species". State and local concern species are addressed later in the same section: "The ...Service will inventory, monitor, and manage state and locally listed species in a manner similar to its treatment of federally listed species to the greatest extent possible. In addition, the Service will inventory other native species that are of special management concern to parks (such as rare, declining, sensitive, or unique species and their habitats) and will manage them to maintain their natural distribution and abundance" (NPS 2006).

Two species with federal status, Mexican spotted owl (*Strix occidentalis lucida*, listed as Threatened) and yellow-billed cuckoo (*Coccyzus americanus*, proposed for listing as Threatened), occur in the park (USFWS 2012). Mexican wolf (*Canis lupus baileyi*), and northern Aplomado falcon (*Falco femoralis septentrionalis*), both federally listed as Endangered, are extirpated from the park.

Within Guadalupe Mountains National Park, Mexican spotted owls breed in mixed conifer woodlands. The park is not included in the designated critical habitat for the spotted owl, but the park's wilderness contains 11 spotted owl Protected Activity Centers, each based on a known nesting or roosting site (Figure 10).

Park records include at least four sightings of yellow-billed cuckoos (1987, 1991, 1996, and 2005), all in McKittrick Canyon (Figure 10). The Northern Prairie Wildlife Research Center's checklist of birds for the park includes yellow-billed cuckoo as a rare summer/fall breeder (USGS 2014).

The only specimen of the gray wolf from the park is a skull documented in 1901. There are no other reliable reports of wolf sightings from the park, and by the time Guadalupe Mountains NP was established in 1972, the gray wolf was considered extirpated from west Texas.

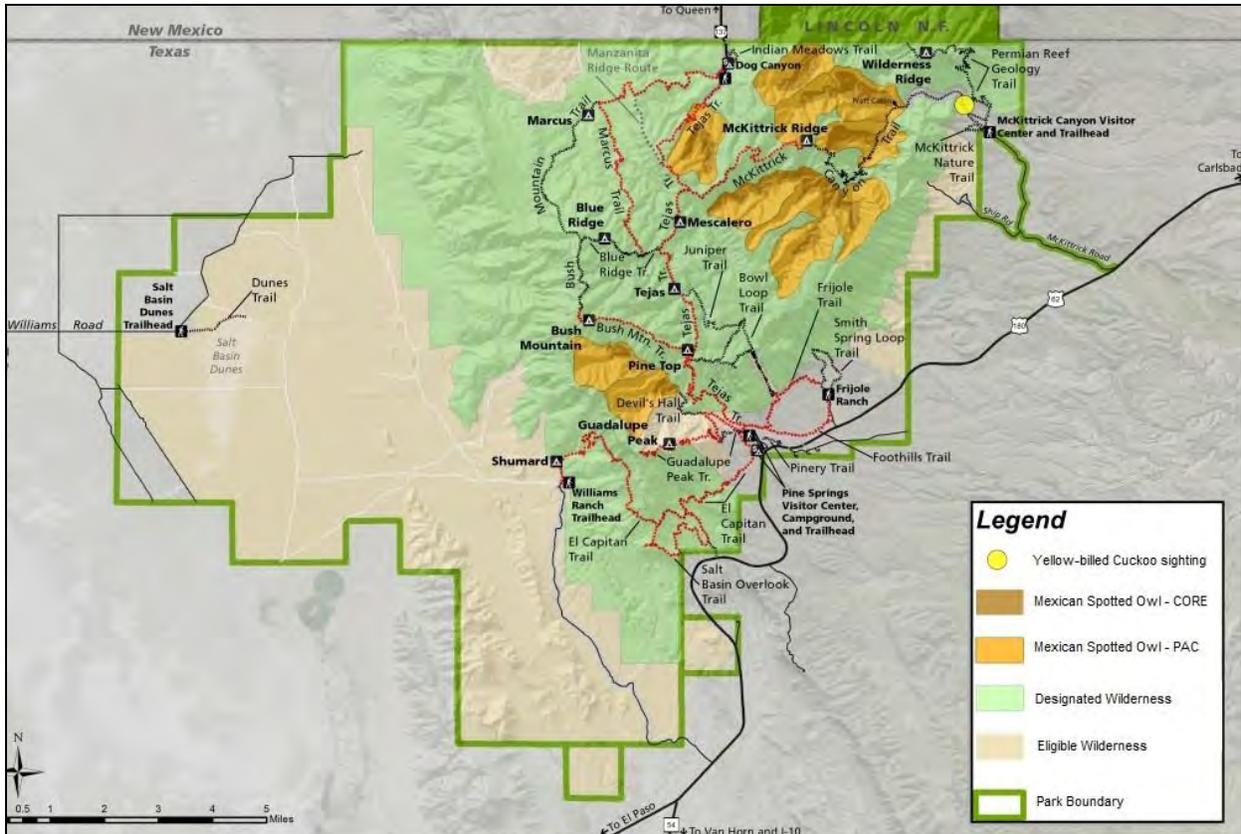


Figure 10. Locations of Protected Activity Centers for Mexican Spotted Owl in Guadalupe Mountains NP, as well as the approximate location of yellow-billed cuckoo sightings.

Intensity Level Definitions

Negligible - Implementation could result in change to the habitat or to a population or individuals of a species, but the change would be so small that it would not be of any measurable or perceptible consequence.

Minor - Implementation could result in change to the habitat or to a population or individuals of a species. The change would be measurable but would be small and localized and of little lasting consequence.

Moderate - Implementation could result in change to the habitat or to a population or individuals of a species. The change would be measurable and of consequence to a species or resource but more localized or of relatively short duration.

Major - Implementation would have a noticeable effect on the habitat or to a population or to a large number of individuals of a species. The change would be measurable and would have a severely adverse or major beneficial impact. Impacts could have permanent consequences for a species or its habitat.

Impacts of Alternative A - No Action

This alternative would result in no additional impacts to species of concern. The park would continue to conduct inventories for species of concern during the project planning phase before rehabilitating administrative facilities, trails or campsites, and would initiate consultations with the

U.S. Fish and Wildlife Service for potential impacts to federally listed species. There would be no attempt to restore or accelerate the recovery of habitat for species of concern.

Cumulative Effects: This alternative does not propose any actions that would add to the impacts caused by existing facilities. The ongoing project to remove interior fences will improve wildlife habitat. The cumulative impacts of this alternative are negligible.

Impacts of Alternative B – Emphasis on improving ecosystem integrity and wilderness character

Alternative B would have minor, temporary impacts to species of concern. Most of the effect would result from habitat restoration in high country woodlands and desert grasslands. Removal of woody vegetation in these ecosystems would be disruptive to animal species using them, but this can be mitigated by restricting removal activities to seasons when the sensitive species are dormant or absent. Sensitive habitats, including areas that represent core habitat for sensitive species such as Mexican spotted owls or Guadalupe fescue, would be off-limits to camping or off-trail travel.

Cumulative Effects: The cumulative effects of this alternative are minor. Some of the existing trail and campground system is located near populations of sensitive species, and the species persist at current levels of use. No new facilities would be built, so that there would be no additional impacts from the construction, maintenance, and use of these facilities. The disturbance associated with removing campsites and historic sites would be mitigated by being timed when sensitive species would be dormant or absent.

Impacts of Alternative C – Emphasis on visitor access and enjoyment

Alternative C would have minor impacts on sensitive species. Nearly all of the proposed new facilities (trails, backcountry campgrounds) would be located in areas with a history of disturbance (abandoned ranch roads, well sites); therefore, direct impacts from construction would be minimized. Site- and route-specific surveys for species of concern and their habitats would be conducted prior to any construction, and facilities would be relocated if there is any conflict. Use of the trails and campgrounds by visitors may create a small degree of disturbance to birds in the vicinity of the new facilities, as the spring nesting season is also the season of heaviest visitation.

Cumulative Effects: Under this alternative, new permanent facilities would be installed, but with correct mitigation (e.g., surveys and avoiding populations and habitat), overall impacts would be minor. Existing facilities and use levels do not conflict with sensitive species, and there are no other proposed or reasonably foreseeable projects that would affect these species.

Impacts of Alternative D – Protect and Restore Natural and Cultural Resources While Increasing the Range of Recreational Opportunities within Wilderness

Alternative D would have minor impacts on species of special concern. Nearly all of the proposed new facilities (trails, backcountry campgrounds) would be located in areas already disturbed (abandoned ranch roads, well sites); therefore, direct impacts from construction would be minimized. Site- and route-specific surveys for species of concern and their habitats would be conducted prior to any construction, and facilities would be relocated if there is any conflict. Use of the trails and campgrounds by visitors may create a small degree of disturbance to birds in the vicinity of the new facilities, as the spring nesting season is also the season of heaviest visitation. Minor, temporary impacts on species of concern would also result from habitat restoration in high country woodlands and desert grasslands. Removal of woody vegetation in these ecosystems would be disruptive to animal species using them, but this can be mitigated by restricting removal activities to seasons when the sensitive species are dormant or absent.

Cumulative Effects: The cumulative effects of this alternative to sensitive species are minor. Disturbance associated with trail construction, campground establishment, and use of these facilities would be mitigated by siting them away from populations or habitat. Disturbance associated with ecosystem restoration would likewise be mitigated by avoiding sensitive areas and by timing activities when sensitive species are dormant or absent. A small amount of disturbance of sensitive species occurs because the existing trail system passes through or near sensitive species habitat; for example, Guadalupe rabbitbrush plants grow adjacent to the Devil's Hall trail, and some of the trails in the high country pass through Protected Activity Centers for the Mexican spotted owl. Disturbances caused by hikers to sensitive species are likely to be incidental. None of the existing campgrounds are in or near sensitive species habitat, and new facilities would likewise be located to avoid impacts.

Abiotic Resources (Water Quality, Soil)

Affected Environment

Wilderness areas are generally assumed to have near-pristine air, soil and water resources. Visible deviations from this expectation (e.g. poor visibility due to pollution, eroding unvegetated slopes, or streams choked by algae) detract from the aesthetic qualities of wilderness as well as from the Natural quality of wilderness character. Wilderness areas are also in some cases held to a higher standard in law; for example the Clean Air Act decrees that wilderness areas greater than 5,000 acres in size are Mandatory Class 1 airsheds.

The Guadalupe Mountains wilderness has been affected by more than a century of livestock ranching that occurred before the park was established in 1972. Water and soil resources still show effects of these uses; for example, Dog Canyon spring is partially contained by concrete walls and biological soil crusts in the Salt Basin are still in the early stages of re-establishment following the removal of livestock in 1988. In general, the condition of these resources has improved in the past 25-40 years and will continue to do so.

Intensity Level Definitions

For purposes of analyzing potential impacts to water quality and soil resources, the thresholds of change for the intensity of an impact are defined as follows:

Negligible - Impacts to water quality or to soil resources is at the lowest levels of detection - barely measurable, with no perceptible consequences, either adverse or beneficial to visitor experience or to biota dependent on these resources.

Minor - Actions result in impacts to water quality or soil resources that are perceptible or measurable, but are of short duration or affect a limited area.

Moderate - Actions result in impacts to water quality or soil resources that are noticeable and have measurable effects on visitor experience or biota that depend on these resources.

Major - Actions result in impacts to water quality or soil resources that are significant and remarkable. Visitor experience is negatively affected and/or biota depending on these resources are severely or permanently affected.

Water Quality

Guadalupe Mountains National Park is a semi-arid island in a sea of arid Chihuahuan desert. Annual rainfall for the park averages 15.4 inches at park headquarters, 9.8 inches in the Salt Basin, and 21.6 inches in the high mountain areas (WRCC 2014). Surface water is extremely limited. Of

the 23 springs named in the park's first formal spring survey (GUMO 1991), most flow only for a few dozen feet below their source. Nearly all the canyons in the park are dry except for short periods following heavy rain events. Only McKittrick Canyon contains a permanent surface stream, and this is spatially intermittent depending on spring flow rates and the extent of travertine formation in the stream bed. Due to the lack of surface water in the park, water quality monitoring has been limited to four reaches of McKittrick Creek and a few springs in the park's front country (Figure 11).

Water quality in the park is very good. Warm summer temperatures cause a seasonal drop in dissolved oxygen and an increase in algae growth, but in general the water in springs and streams does not exceed state or EPA standards for any of the parameters we monitor (Table 10). The park recent began analyzing water samples for coliform bacteria in order to detect problems resulting from a lack of sanitary facilities in McKittrick Canyon. To date, no problems with coliform bacteria have been detected.

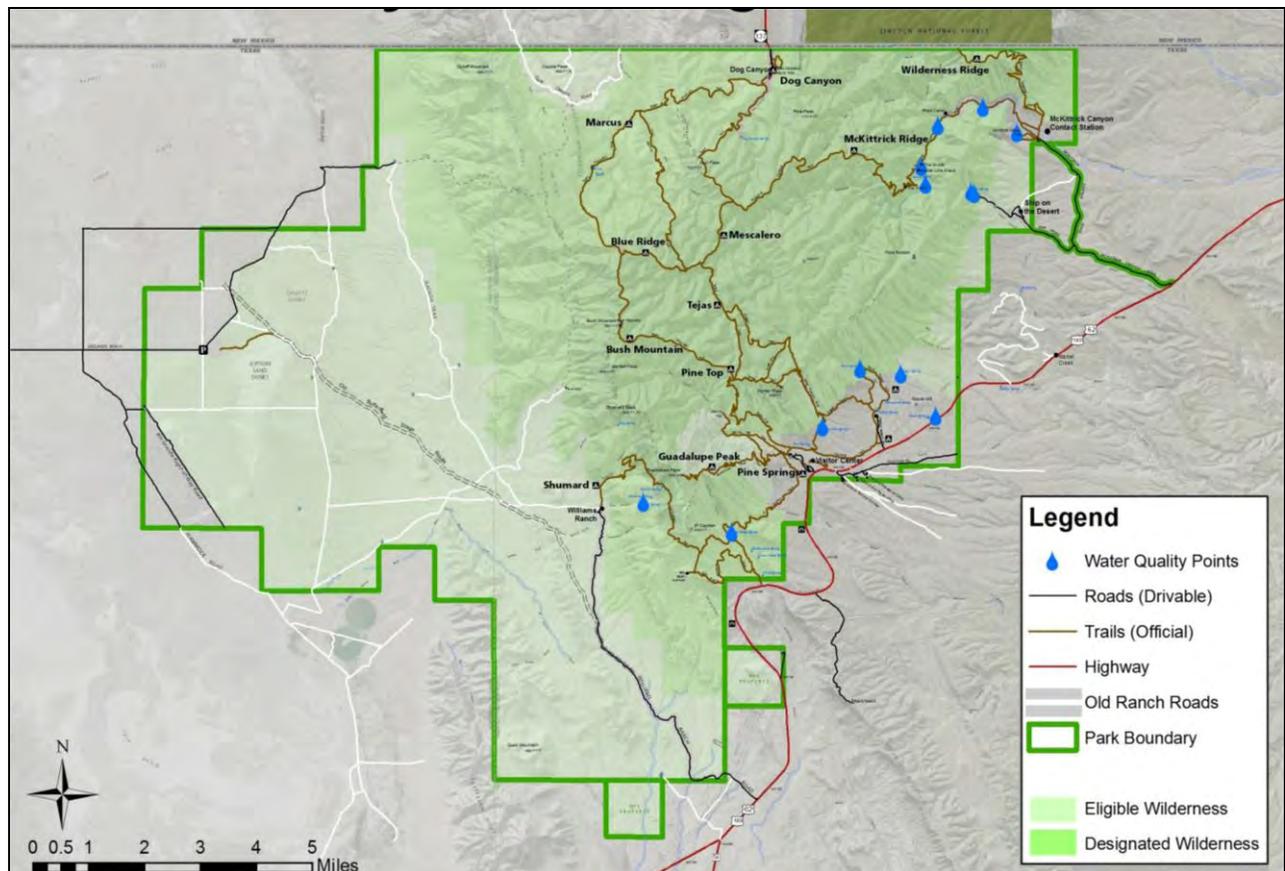


Figure 11. Locations of water quality monitoring sites within Guadalupe Mountains National Park.

Table 60. Water quality data collected within Guadalupe Mountains National Park. Monitoring has been ongoing since 1987.

Location	pH	Temp-erature	Wetted extent	Dissolved O2	Conductivity	Chemistry [†]	Fecal coliform
McKittrick 1	X	X		X	X	X	X
McKittrick 2	X	X		X	X	X	X
McKittrick 3	X	X		X	X	X	X
McKittrick 4	X	X		X	X	X	X
Choza Spring	X	X	X	X	X		
Smith Springs	X	X	X	X	X		
Dog Canyon Spring	X	X	X	X	X		
Bone Spring	X	X	X	X	X		
Guadalupe Spring	X	X	X	X	X		
Algae Spring	X	X	X	X	X		
Big Seep	X	X	X	X	X		
Cherry Seep	X	X	X	X	X		
Bone Spring	X	X	X	X	X		
Juniper Spring	X	X	X	X	X		
Upper Pine Springs	X	X	X	X	X		

[†] Chemical constituents tested through 2013 include chloride, calcium, nitrate, phosphorus, and sulfate. Since January 2014, water quality tests include fluoride, chloride nitrogen, sulfate, phosphorous, calcium, magnesium, potassium, sodium, specific conductance, alkalinity and total dissolved solids.

Soil

The USDA-Natural Resources Conservation Service recently completed a soil survey for Guadalupe Mountains National Park (NRCS 2010). This survey describes and maps 22 soil types grouped into 14 map units. Soil types derived from alluvium are the most common in the park, followed by shallow soils derived from the underlying limestone bedrock. Nearly all park soils are classified as Aridisols.

Most soils in the park are somewhat resistant to erosion because of rocky surfaces and permeable textures. Soils most likely to erode following disturbance fall into one of two groups: First, soils on extremely steep slopes, which describes at least half of the park or second, soils with a high percentage of silt and fine sand particles that are prone to movement by water and wind. The NRCS soil survey included a general analysis of which soil types might be more or less suitable for campsites and trails (Figure 12, Table 11).

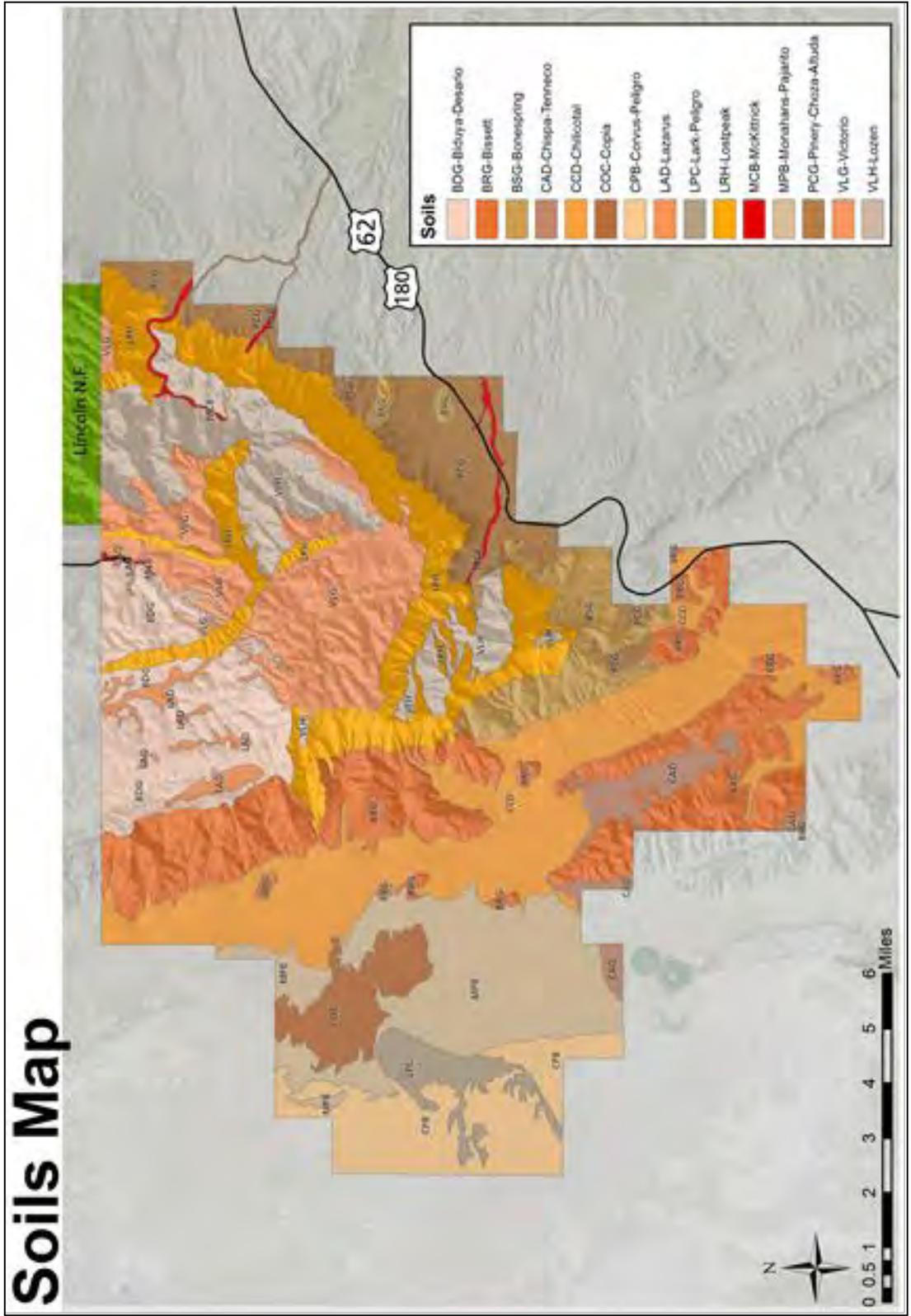


Figure 12. Generalized soils map for Guadalupe Mountains NP. Units are the same as in Table 11.

Table 71. Suitability of GUMO soils for development of wilderness trails and camp sites. These developments can still occur on soils with limitations, as long as the design of the facility takes these factors into account.

Map Unit Code-Soil Name	Suitability for Camping Areas	Suitability for Foot and Horse Trails	Hazard of Erosion	Landform	Distribution in Park
BDG-Biduya	Very limited (steep, rocky, dusty, shallow)	Somewhat limited (rocky, dusty)	Moderate	Mountain slopes	Brokeoff Mountains slopes
BDG-Desario	Very limited (steep, shallow, dusty)	Very limited (slopes, dusty)	Severe	Mountain slopes	
BRG-Bissett	Very limited (steep, shallow, dusty)	Very limited (water erosion, slopes, dusty)	Severe	Foothill slopes	Western foothills & Escarpment, Patterson Hills
BSG-Bonespring	Very limited (steep, shallow, gravelly)	Very limited (slopes)	Severe	Mountain slopes	Western foothills & Escarpment
CAD-Chispa	Somewhat limited (dusty, slopes)	Somewhat limited (dusty, water erosion)	Moderate to Severe (slope)	Foothill slopes / upper alluvial fans	Younger alluvial flats; upper El Centro Draw
CAD-Tenneco	Somewhat limited (dusty)	Somewhat limited (dusty)	Moderate	Foothill slopes / upper alluvial fans	
CCD-Chilicotal	Somewhat limited (dusty, slopes)	Somewhat limited (dusty)	Moderate	Gravelly alluvial fans	Older mid- and upper alluvial fans in Salt Basin
COC-Copia	Very limited (very sandy)	Very limited (very sandy)	Moderate	Dunes	Red quartz dunes in Salt Basin
CPB-Corvus	Very limited (shallow to caliche, dusty)	Somewhat limited (dusty)	Slight	Gypsum dunes	Floor of Salt Basin
CPB-Peligro	Somewhat limited (dusty)	Somewhat limited (dusty)	Slight	Playa lake deposits (gypsum)	
LAD-Lazarus	Not limited	Not limited	Moderate	Mountain valleys	PX Flat, other flat valley bottoms
LPC-Lark	Not limited	Not limited	Moderate	Dunes	Gypsum dune field in Salt Basin
LPC-Peligro	Somewhat limited (sandy)	Somewhat limited (sandy)	Moderate	Interdune swales	
LRH-Lostpeak	Very limited (steep, rocky, shallow)	Very limited (steep slopes)	Severe	Mountain slopes	Warm canyon walls and slopes, Eastern Escarp.
MCB-McKittrick	Very limited (flooding)	Somewhat limited (flooding)	Slight	Canyon floodplains	Floodplains of McKittrick and other canyons
MPB-Monahans	Not limited	Not limited	Moderate	Alluvial fans	Alluvial fan outer toes in Salt Basin
MPB-Pajarito	Somewhat limited (dusty)	Somewhat limited (dusty)	Moderate	Alluvial fans	

Map Unit Code-Soil Name	Suitability for Camping Areas	Suitability for Foot and Horse Trails	Hazard of Erosion	Landform	Distribution in Park
PCG-Altuda	Very limited (steep, shallow, rocky, dusty)	Very limited (steep, dusty)	Severe	Foothill slopes	Foothills and fans below the eastern Escarpment
PCG-Pinery	Somewhat limited (slopes, rocky, dusty)	Somewhat limited (dusty)	Moderate	Alluvial fans	
PCG-Choza	Very limited (shallow, slopes, rocky, dusty)	Somewhat limited (dusty)	Moderate	Alluvial fans	
VLG-Victorio	Very limited (steep, rocky, shallow)	Somewhat limited (steep slopes)	Severe	Mountain slopes	Cool (north- & east-facing canyon walls and mountain slopes)
VLG-Lozen	Very limited (rocky, shallow, steep)	Somewhat limited (steep slopes, rocky)	Severe	Mountain slopes	

Impacts of Alternative A – No Action

This alternative would have negligible effects on soil and water resources. No new trails or campgrounds would be developed. Access to the Salt Basin would be restricted to day-use only, so that the opportunity for erosion of social trail systems would be minimal. Conditions affecting water quality and quantity would not change; no backcountry toilets would be installed.

Cumulative Effects: No additional effects are likely to soil or water resources under this alternative. The cumulative impact to these resources is negligible.

Impacts of Alternative B – Emphasis on improving ecosystem integrity and wilderness character

This alternative would have minor (positive) impacts to soils and negligible impacts to water quality. Removing and reclaiming roads and other ranching era infrastructure would have short-term negative impacts, but in the long run would be positive, because disturbed areas that are currently eroding would be stabilized and reseeded. Efforts to restore desert grasslands and montane pine forests over a large area would slow runoff and allow more precipitation to infiltrate to groundwater, thereby potentially increasing spring flow and improving water quality. However, a lack of sanitary facilities in McKittrick Canyon would continue to pose a potential threat to surface water quality in McKittrick Creek.

Cumulative Effects: Cumulative impacts of this alternative are minor. Impacts to soils resulting from the current campground and trail system are mitigated periodically by maintaining water bars and trail tread. Under this alternative, dispersed use is encouraged and some campgrounds and trails would be removed and restored, thereby reducing local erosion further. There are no other ground-disturbing projects in the foreseeable future within the Guadalupe Mountains Wilderness. There would be no additional impacts to water quality, as the current situation would not change.

Impacts of Alternative C – Emphasis on visitor access and enjoyment

This alternative would have minor (negative) impacts on soils and (positive) on water quality. The horse trail loop and campgrounds proposed for the Salt Basin would be built primarily along the

route of abandoned ranch roads in Monahans-Pajarito complex, which has no limitations for trails and has moderate erosion potential. The dunes foot trail would be built in Copia fine sand which has moderate erosion potential and whose primary limitation for recreation is its sandiness. The erosion issue can be mitigated by proper trail construction techniques (e.g., outsloping, water bar spacing and location).

Installing backcountry toilets at Guadalupe Peak and especially in McKittrick Canyon would help to protect water quality. Impact of this alternative on water quality is therefore minor (beneficial).

Cumulative Effects: Cumulative impacts of this alternative are minor. Impacts to soils resulting from the current campground and trail system are mitigated periodically by maintaining water bars and trail tread. Impacts to soils from the more than 40 miles of new trails combined with backcountry campground construction, maintenance, and use will increase slightly, even with mitigation to help control erosion. Installing backcountry toilets will help to ensure that water quality in McKittrick Canyon is protected.

Impacts of Alternative D – Protect and Restore Natural and Cultural Resources While Increasing the Range of Recreational Opportunities within Wilderness

This alternative would have minor impacts on soils and negligible impacts on water quality. The new eastern escarpment trail proposed in this alternative would cross Pinery/Choza/Altuda soils with limitations due to dust and moderate erosion potential (Table 11). The horse trail loop and campgrounds proposed for the Salt Basin would be built primarily along the route of abandoned ranch roads in Monahans-Pajarito complex, which has no limitations for trails and has moderate erosion potential. The dunes foot trail would be built in Copia fine sand which has moderate erosion potential and whose primary limitation for recreation is its sandiness. The erosion issue can be mitigated by proper trail construction techniques (e.g., outsloping, water bar placement).

There will be no direct impacts to water resources; however, as creosote shrublands are removed and desert grasslands restored, infiltration of precipitation would likely increase and runoff/erosion would likely decrease. Water quality in McKittrick Creek will continue to be monitored; if fecal coliform bacteria reach a level indicating that under Texas law it is unsafe for humans to contact the water, the park would take action to prevent further deterioration (e.g. visitor education, increased patrols and enforcement, providing WAG bags or the equivalent, or installing backcountry toilets).

Cumulative Effects. Impacts to soils from the trails and backcountry campground construction, maintenance, and use will increase slightly, even with mitigation to help control erosion. Some abandoned ranch roads that are experiencing significant erosion will be stabilized and removed, which may further mitigate cumulative impacts to soils. Impacts to water resources would likely decrease with conversion of creosote shrublands to desert grasslands. Overall, cumulative effects on water and soil resources will be minor.

Archeological and Ethnographic Resources

Laws addressing archeological resources in national parks include the National Historic Preservation Act, Executive Order 11593, the Archeological and Historic Preservation Act, the Archeological Resources Protection Act, the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, and the Programmatic Memorandum of Agreement Among the NPS, Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers (1995). These laws require that archeological sites are identified, their significance determined, and protected or thoroughly documented.

The Guadalupe Mountains Wilderness contains a rich legacy of human use and occupation from prehistoric times through the present. The lands now encompassed by Guadalupe Mountains National Park include a broad range of natural resources used by Native Americans and early Hispanic and Anglo-American settlers, from salt for preserving food to mineral pigments and herbs for ceremonial purposes, to wild game and a diversity of plants for food and fiber. The park is rich in evidence of these uses, some of which are carried on today by the tribes traditionally affiliated with the park (Greenberg 1996). The mountains themselves are sacred to the Mescalero Apache, especially Guadalupe Peak and El Capitan.

Archeological surveys within the Guadalupe Mountains Wilderness have documented more than 400 archeological sites; however, most surveys covered the park's high country and the base of the eastern escarpment. Most of the western third of the park below the western escarpment has yet to be surveyed for archeological features.

The routes of proposed new trails and the locations of proposed camping areas would be surveyed for archeological features during the planning stage. If sites or features are located that could be affected by trail construction or visitor use, the facilities (trails and campsites) will be relocated to a neutral site. Likewise, if any of the affiliated tribes indicate that a particular site is culturally sensitive, any facility planned for that site will be relocated.

For purposes of analyzing impacts to archeological resources either listed in or eligible for listing in the National Register, levels of impact intensity are defined as follows:

Intensity Level Definitions

Negligible - Impact is at the lowest levels of detection - barely measurable, with no perceptible consequences, either adverse or beneficial, to archeological resources. For purposes of NHPA §106, the determination of effect would be no adverse effect.

Minor Adverse - Disturbance of a site(s) results in little, if any, loss of significance or integrity and the National Register eligibility of the site(s) is unaffected. For purposes of NHPA §106, the determination of effect would be no adverse effect.

Minor Beneficial - Maintenance preservation of a site(s). For purposes of NHPA §106, the determination of effect would be no adverse effect.

Moderate Adverse - Disturbance of a site(s) does not diminish the significance or integrity of the site(s) to the extent that its National Register eligibility is jeopardized. For purposes of NHPA §106, the determination of effect would be adverse effect.

Moderate Beneficial - Stabilization of site(s). For purposes of NHPA §106, the determination of effect would be no adverse effect.

Major Adverse - Disturbance of a site(s) diminishes the significance and integrity of the site(s) to the extent that it is no longer eligible to be listed in the National Register. For purposes of NHPA §106, the determination would be adverse effect.

Major Beneficial - Active intervention to preserve resources. For purposes of NHPA §106, the determination of effect would be no adverse effect.

Impacts of Alternative A – No Action

This alternative would have negligible effects on archeological or ethnographic resources. Surveys for these resources and evaluations of their significance would not occur. No new campgrounds or trails that could potentially affect archeological sites or permit access to ethnographic sites would be developed. Resources in the Salt Basin would be somewhat protected simply because of the lack of trails within the area. Although tribal access to culturally significant sites in the Salt Basin would

not be prevented under this alternative, neither would it be facilitated, as the area would remain open for day use only and there would be no formal trail system.

Cumulative Effects: Archeological sites experienced minor impacts when the original trail system was established; at least two archeological sites are bisected by trails. No additional effects are likely to archeological or ethnographic features under this alternative. The cumulative impact to these resources is therefore minor.

Impacts of Alternative B – Emphasis on improving ecosystem integrity and wilderness character

Under this alternative, no new trails would be constructed, and some campsites would be removed. The increased emphasis on off-trail travel and camping could potentially expose some archeological sites or features to random visitation and potential looting; proposed open camping areas would therefore require a pedestrian archeological survey at a minimum. Use would be directed away from culturally sensitive sites as it would be for sites with sensitive natural features. Potential impact to archeological resources under this alternative is minor.

Cumulative Effects: Archeological sites experienced minor impacts when the original trail and backcountry campground system was established; at least two archeological sites are bisected by trails. If properly mitigated (see survey requirement above), no additional effects are likely to archeological or ethnographic features under this alternative. The cumulative impact to these resources is therefore minor.

Impacts of Alternative C – Emphasis on visitor access and enjoyment

This alternative proposes the most new facilities for backcountry visitors of any of the alternatives – approximately 45 miles of new trails in the Salt Basin, three new campgrounds and two backcountry toilets. The exact location of these facilities would not be determined until potential sites were surveyed and cleared for any conflicts with cultural resources. Facilities would only be located in areas without significant impacts to cultural resources. However, even with mitigation, the Salt Basin would see an increase in visitor use, and the potential for site vandalism or looting would likewise increase. Potential impacts to archeological resources under this alternative are therefore moderate.

Cumulative Effects: Archeological sites experienced minor impacts when the original trail and backcountry campground system was established; at least two archeological sites are bisected by trails. Even if properly mitigated (see survey requirement above), additional effects are possible to archeological or ethnographic features under this alternative. The cumulative impact to these resources is therefore moderate.

Impacts of Alternative D – Protect and Restore Natural and Cultural Resources While Increasing the Range of Recreational Opportunities within Wilderness

This alternative proposes a substantial suite of new trails and campsites, although less than Alternative C. This alternative includes approximately 38 miles of new trails (28 miles in the Salt Basin) and three new campgrounds. The exact location of these facilities would not be determined until potential sites were surveyed and cleared for any conflicts with cultural resources. Facilities would only be located in areas without significant impacts to cultural resources. However, even with mitigation, the Salt Basin would see an increase in visitor use, and the potential for site vandalism or looting would likewise increase. Potential impacts to archeological resources under this alternative are therefore moderate.

Cumulative Effects: Archeological sites experienced minor impacts when the original trail and backcountry campground system was established; at least two archeological sites are bisected by

trails. Even if properly mitigated (see survey requirement above), additional effects are possible to archeological or ethnographic features under this alternative. The cumulative impact to these resources is therefore moderate.

Historic Structures

Laws addressing historic structures in national parks include the National Historic Preservation Act, Executive Order 11593, the Archeological and Historic Preservation Act, the Archeological Resources Protection Act, the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, and the Programmatic Memorandum of Agreement Among the NPS, Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers (1995). These documents require that historic structures be identified and their significance determined, so that they can be evaluated for eligibility for listing on the National Register of Historic Places and protected or thoroughly documented.

The General Management Plan (NPS 2012) confirms the commitment of the National Park Service to understand and protect historic structures: "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 Secretary of the Interior's Standards for the Treatment of Historic Properties: with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings (Secretary of the Interior 1995a) (unless it is determined through a formal process that disturbance or natural deterioration is unavoidable). "

All of the action alternatives require the park to complete an inventory of historic structures and artifacts in wilderness. Because of its prior history as working ranch land, the Guadalupe Mountains Wilderness contains many structures, some of which are eligible for the National Register of Historic Places. These include line cabins, metal water tanks, stone dams, and other parts of the elaborate system of water distribution that supported livestock operations (Figure 13). None of these structures has been stabilized except the Hunter Line Cabin in McKittrick Canyon. Some structures that were deemed ineligible for the National Register have been removed from wilderness, while others remain. Very little of the ranching infrastructure in eligible wilderness has been evaluated, except for the system of interior fences, which was determined not to be historically significant and is in the process of being removed.

In order for a structure to be listed in the National Register of Historic Places, it must possess integrity of location, design, setting, materials, feeling, association, and workmanship. It must also meet at least one criterion of significance:

- It is associated with events that made a significant contribution to the broad patterns of our history
- It is associated with the lives of persons significant in our past
- It embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic value, or represents a significant and distinguishable entity whose components may lack individual distinction
- It has yielded, or may be likely to yield, information important in prehistory or history



Figure 13. Large metal tank that was part of the system used to store and distribute water throughout the high country. Water stored in this tank was pumped more than 2000 vertical feet from springs at the base of the escarpment.

For purposes of analyzing potential impacts to historic structures, the thresholds of change for the intensity of an impact are defined as follows:

Intensity Level Definitions

Negligible: The impact to historic structures is at the lowest level of detection; barely measurable with hardly any perceptible consequences, either adverse or beneficial. For the purposes of §106 under NHPA, the determination of effect would be "no adverse effect".

Minor: The impact to historic structures is detectable and measurable. If the impact would not diminish the overall integrity or significance of the resource and the National Register eligibility of the resource would be unaffected. For the purposes of §106 under NHPA, the determination of effect would be "no adverse effect".

Moderate: The impact to historic structures is readily apparent and considerably measurable. If adverse, the impact would result in the loss of some integrity or significance of the resource and/or the impact would change one or more of the character defining features of the resource, but would not affect the National Register eligibility of the resource. For the purposes of §106 under NHPA, the determination of effect would be "adverse effect".

Major: The impact to historic structures is highly noticeable and substantial. If adverse, the impact would result in the loss of integrity or significance of the resource and/or would change one or more of the character defining features of the resource to the extent that it would no

longer be eligible for listing in the National Register of Historic Places. For the purposes of §106 under NHPA, the determination of effect would be “adverse effect”.

Impacts of Alternative A – No Action

This alternative would have negligible effects on historic structures. Surveys for historic structures and evaluations of their significance would not occur. No new campgrounds or trails that could potentially affect historic structures would be developed. Historic structures would not be stabilized but would be allowed to deteriorate naturally as recommended in the existing Backcountry / Wilderness Management Plan (NPS 1995).

Cumulative Effects: No measurable effects are likely to historic structures under this alternative. The cumulative impact to historic structures therefore is negligible.

Impacts of Alternative B – Emphasis on improving ecosystem integrity and wilderness character

Under this alternative, impacts to historic structures would be moderate. The NPS would conduct a comprehensive inventory and evaluation of ranching-era historic structures in wilderness. Sites and structures determined not to be eligible for the National Register of Historic Places would be removed in order to improve the Undeveloped quality of wilderness character. Sites and structures eligible for the National Register would remain, but would be allowed to deteriorate naturally. Because no new trails would be developed under this alternative, historic structures, especially in the Salt Basin, would be effectively protected from human intrusion and vandalism.

Cumulative Effects: Significant additional effects to historic structures are likely under this alternative. Although no new trails or campgrounds would be constructed, many historic sites and structures would be removed or obliterated after thorough documentation. Combined with effects resulting from the construction of the existing trail and campground system, as well as earlier efforts to remove dangerous and deteriorated structures, the cumulative effects would be major.

Impacts of Alternative C – Emphasis on visitor access and enjoyment

This alternative would have minor impacts to historic structures. The NPS would conduct a comprehensive inventory and evaluation of ranching-era historic structures in wilderness. Sites and structures would be documented and evaluated for their eligibility for the National Register of Historic Places. Some of the new trails and campgrounds would be within sight of the larger structures (e.g., windmills and water tanks), increasing visitation and the potential for vandalism. Only sites determined to pose a significant risk to the public or to the environment would be removed. The most significant sites would be stabilized and protected. Interpretive information would be available outside of wilderness to tell the story of early settlers and ranchers, so that visitors can appreciate this part of the park’s history and relate it to the structures that persist.

Cumulative Effects: Minor additional effects to historic structures are likely under this alternative. New trails and campgrounds would be located in order to avoid direct impacts; however, indirect impacts from increased visitation to sites in the Salt Basin are likely. Only sites and structures that pose a human or environmental hazard would be removed or obliterated under this alternative. Enough structures would remain in order for visitors to comprehend the difficulty of making a living in this harsh environment. Combined with effects resulting from the construction of the existing trail and campground system, as well as earlier efforts to remove dangerous and deteriorated structures, the cumulative effects would be moderate.

Impacts of Alternative D – Protect and Restore Natural and Cultural Resources While Increasing the Range of Recreational Opportunities within Wilderness

This alternative would have minor impacts to historic structures. The NPS would conduct a comprehensive inventory and evaluation of ranching-era historic structures in wilderness. Sites and structures would be documented and evaluated for their eligibility for the National Register of Historic Places. Some of the new trails and campgrounds would be within sight of the larger structures (e.g., windmills and water tanks), increasing visitation and the potential for vandalism. Only sites determined to pose a significant risk to the public or to the environment would be removed. Sites and structures would not be stabilized but would be allowed to deteriorate naturally. Interpretive information would be available outside of wilderness to tell the story of early settlers and ranchers, so that visitors can appreciate this part of the park's history and relate it to the structures that persist.

Cumulative Effects: Minor additional effects to historic structures are likely under this alternative. New trails and campgrounds would be located in order to avoid direct impacts; however, indirect impacts from increased visitation to sites in the Salt Basin are likely. A few sites and structures would be removed or obliterated. Enough structures would remain in order for visitors to comprehend the difficulty of making a living in this harsh environment. Combined with effects resulting from the construction of the existing trail and campground system, as well as earlier efforts to remove dangerous and deteriorated structures, the cumulative effects would be moderate.



Devil's Hall in autumn

CONSULTATION AND COORDINATION

Agency Consultation

NPS contacted the Fish and Wildlife Service to request input on the potential for the Wilderness Stewardship and Trails Plan to affect federally listed special status species. The park also contacted the Texas Parks and Wildlife Department and several State of New Mexico agencies with a similar request regarding state-listed species.

USFWS responded to the scoping letter by suggesting that we include the Rio Grande cutthroat trout (*Oncorhynchus clarkii virginialis*) to the park's Species of Concern list (Table 8b). Although there is no direct evidence that this species ever occurred in the park, several fisheries experts have suggested that it may have occurred in McKittrick Creek (Behnke 1992, Garrett and Matlock 1991). USFWS also suggested that we include special planning consideration for any trails or campsites in the vicinity of caves that may contain endemic fauna. These suggestions have been incorporated into this document.

In addition to providing species occurrence information from the Texas Natural Diversity Database, Texas Parks and Wildlife Department responded with several suggestions for improving the effectiveness of the plan in protecting sensitive species: (1) include tactical guidelines regarding how to avoid impacts to specific sensitive species, (2) incorporate concepts from the Texas Conservation Action Plan (2012) for improving populations and habitats of declining sensitive species to obviate the need for federal listing as Threatened or Endangered. These suggestions have been included in this document.

Daniela Roth, Botany Program Manager with the New Mexico Department of Forestry, suggested the addition of *Viola calcicola*, a recently described species (McCauley and Ballard 2013), to the sensitive species list based on the type locality at Smith Spring (in designated wilderness).

In accordance with §106 of the National Historic Preservation Act, we provided the Texas Historic Preservation Officer (SHPO) an opportunity to comment on the potential effects of this project. The SHPO expressed a desire to remain involved in the planning process and requested additional information on the various historic structures that could be affected by the different alternatives. This information was provided directly to the SHPO and is not included in this document.

Both the Carlsbad and Las Cruces offices of the Bureau of Land Management responded to our request for input with statements of support for the alternatives in the plan and acknowledgement that proposed NPS management of designated and eligible wilderness is consistent with BLM management direction.

Native American Consultation

Fifteen Native American tribes with traditional affiliations with the Guadalupe Mountains were contacted by letter in April 2014 to determine if they had any concerns with the draft alternatives or wanted to be involved in the environmental compliance process:

- The Apache Tribe of Oklahoma
- The Comanche Nation, Oklahoma
- The Fort Sill Apache Tribe of Oklahoma
- Hopi Tribe of Arizona

The Jicarilla Apache Nation, New Mexico
The Kiowa Indian Tribe of Oklahoma
The Mescalero Apache Tribe of the Mescalero Reservation, New Mexico
The Pueblo of Isleta, New Mexico
The Pueblo of Zia, New Mexico
The San Carlos Apache Tribe of the San Carlos Reservation, Arizona
The Tonto Apache Tribe of Arizona
The White Mountain Apache Tribe of the Fort Apache Reservation, Arizona
The Yavapai Apache Nation of the Camp Verde Indian Reservation, Arizona
The Ysleta del Sur Pueblo of Texas
The Zuni Tribe of the Zuni Reservation, New Mexico

Three tribes responded: The Hopi Tribe asked to remain involved in the planning process and requested that we identify and avoid Puebloan ancestral sites. The San Carlos Apache Tribe deferred to the Mescalero Apache for comments regarding the WSP. The Comanche Nation Historic Preservation Office determined that no prehistoric, historic, or archeological resources would be affected.

Environmental Assessment Review and List of Recipients

The EA is subject to a 30-day public comment period. To inform the public of the availability of the EA, NPS publishes and distributes a letter to agencies, tribes, and the park mailing list, as well as placing a notice in local newspapers. The document is available for review on the NPS PEPC website at <http://parkplanning.nps.gov/gumo> and at the Pine Springs Visitor Center. Paper or CD copies of the EA are provided to interested individuals upon request.

During the 30-day public review period, the public is encouraged to submit their written comments to the NPS as described in the instructions at the beginning of this document. Following the close of the comment period, all public comments are reviewed and analyzed, prior to the release of a decision document. The National Park Service formulates responses to substantive comments received during the public comment period, and makes appropriate changes to the EA as needed.

LIST OF PREPARERS

The following persons assisted with the preparation of the EA. All are employees of the National Park Service:

Name/Title	Contribution
Janet Coles, Chief of Natural and Cultural Resource Management	Prepared EA
Geoff Clark, GIS Services / Data Manager	Prepared maps
GUMO Wilderness Stewardship Team: Michael Haynie, Karl Pierce, Mike Stetter, Ryan Romanchuk, Geoff Clark, Bert Rader, Jonena Hearst, John Montoya, Darren Bryant	Developed alternatives, reviewed EA
Dennis A. Vásquez, Superintendent	Reviewed EA



Sunset over El Capitan

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