BIG BEND NATIONAL PARK
TEXAS

WILDLAND FIRE MANAGEMENT PLAN

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Prepared by
BIG BEND NATIONAL PARK

With assistance from
INTERMOUNTAIN REGIONAL OFFICE
Denver, Colorado and Santa Fe, New Mexico

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

WILDLAND FIRE MANAGEMENT PLAN
BIG BEND NATIONAL PARK

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I INTRODUCTION

A. PURPOSE AND NEED FOR DEVELOPMENT OF THIS FIRE MANAGEMENT PLAN

The purpose is to implement an improved and updated Wildland Fire Management Plan (FMP) for Big Bend National Park. The fire management plan provides a framework for making fire-related decisions and serves as an operations manual. Updating the 1994 plan allows changes in fire policy, fire behavior knowledge, prescribed burn results, and revisions in NPS policies to be implemented in practice. By incorporating new information about ecology, fire effects and firefighting techniques, the FMP will improve the protection of people, property, and resources within the park.

Current resource managers acknowledge three major challenges in managing vegetation at the park: greatly increased fuels in forest and some woodlands increasing risk from high-severity fire; invasion of fire-adapted nonnative plant species which threaten to displace native species primarily along the riparian corridor and drainages; and, altered fire patterns from suppression and grazing of livestock. Prioritizing and meeting these challenges requires a significant shift in management direction for training, funding, and support of project monitoring and evaluation, and maintaining the commitment to implementing new policies over the long-term.

Assessments of the park in the 1940s and 1960s suggested that fire be reintroduced to counter changes in vegetation resulting from suppression and grazing. Staff shortages, limited resources and cautious administrators led to continued suppression of most natural ignitions under earlier FMPs (1973, 1978, 1980, and 1994). A prescribed fire program began in 1980 to protect developments and has burned 2,080 acres in 25 years. Two prescribed fires to develop defensible space and reduce fuels that did occur in backcountry escaped, leading to new prescriptions under this revised FMP to ensure greater safety. Over the same 25-year period, there were 242 lightning-caused fires, which burned 19,127 acres, suggesting a need to allow more natural fires to reduce fuels and to burn where they occurred historically.

B. COLLABORATION

This plan was developed with the assistance of the Fire Management Program staff, the Science and Resources Management staff, and the Management Team at Big Bend National Park. The University of Arizona, School of Renewable Natural Resources, assisted through their involvement in completing the Environmental Assessment (EA). The Intermountain Region Fire and Aviation staff made contributions to the plan. The plan began with the foundation on the most recent Fire Management Plan (1994) and then added the most recent information available to complete the process.

As of 2004, Big Bend National Park is in the Southwest Texas Fire Planning Unit. This unit includes four federal administrative units managed by the National Park Service and includes approximately 12.5 million acres of federal, state, NGO, and private lands. The park staff continues to work collaboratively with other federal, state, NGO, and local land management agencies to implement the fire management and interagency planning actions required under the new Fire Program Analysis program.

Figure I–1 Park Location and Neighbors

C. NATIONAL FIRE MANAGEMENT GOALS

The Wildland Fire Management Plan will implement the policies and support the achievement of goals identified in the *Review and Update of the Federal Wildland Fire Management Policy*, *January 2001*, Managing Impacts of Wildfires on Communities and Environment and Protecting People and Sustaining Resources in Fire Adapted Ecosystems – A Cohesive Strategy (1999), and A Collaborative Approach for Reducing Wildland Fire Risks to Communities and Environment: 10-year Comprehensive Strategy Implementation Plan (2002).

Additionally, the plan meets the requirements set forth in *Director's Order-18 (DO-18, NPS 2003*) the NPS guidance for Wildland Fire Management, which states that, "every NPS unit with burnable vegetation must have an approved Fire Management Plan." DO-18 defines what an approved FMP must include, stressing that "firefighter and public safety is the first priority" and promoting "an interagency approach to managing fires on an ecosystem basis across agency boundaries."

D. RELATIONSHIP TO ENVIRONMENTAL COMPLIANCE

General management of the Big Bend National Park, including general guidelines for wildland fire management, has been assessed through the formal analysis process required by the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. 4321-4347. An Environmental Impact Statement (EIS) was written and approved for the General Management Plan (GMP) and the Record of Decision was signed by the Intermountain Regional Director in September 2004.

This Wildland Fire Management Plan, which is a document that is tiered from the GMP and the Resource Management Plan (1995), articulates specific wildland fire management practices, procedures, and policies. Adoptions of programs or plans, such as those that guide or prescribe uses upon which future agency actions may be based, require environmental analyses before a decision is made. That analysis is documented in an Environmental Assessment of the Fire Management Plan for Big Bend National Park. A Finding of No Significant Impact was signed by the Intermountain Regional Director on Sept 29, 2005.

Requirements of the National Historic Preservation Act (NHPA) have been met through a review of the Cultural Resource Component of the Wildland Fire Management Plan by park and regional archeologists and an additional review requested by the Texas State Historic Preservation Office.

Requirements of the Endangered Species Act, Section 7, were met through Formal Consultation with the Fish and Wildlife Service initiated in June of 2005 on three species, a bird, a bat and a cactus. The Fish and Wildlife Service responded with a Biological Opinion which concluded that, as proposed in Big Bend's Fire Management Plan Environmental Assessment and Biological Assessment, the projects are not likely to jeopardize the continued existence of the black-capped vireo, Chisos Mountain hedgehog cactus, or the Mexican long-nosed bat. They also concluded that as no critical habitat had been identified for any of the species, none would be affected.

E. AUTHORITIES

The authority for fire management is found in the National Park Service Organic Act (Act of August 25, 1916), which states that, the Agency's purpose:

> *"… is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."*

This authority was further clarified in the National Parks and Recreation Act of 1978:

> *"Congress declares that…these areas, though distinct in character, are united…into one National Park System…. The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress."*

Additional statutory authorities are:

- The General Authorities Act of 1970
- Establishment-Authorization Act (June 20, 1935, 49 Stat. 393, appended) Establishing Big Bend National Park
- The Clean Air Act, Clean Water Act
- The Endangered Species Act
- The Antiquities Act.

II RELATIONSHIP OF LAND MANAGEMENT PLANNING TO FIRE POLICY

A. NPS MANAGEMENT POLICIES CONCERNING WILDLAND FIRE MANAGEMENT

NPS Management Policies (2001) Section 4.5 defines how the NPS will meet its park management responsibilities under the 1916 NPS Organic Act. The NPS recognizes that the presence as well as the absence of fire influences park landscapes, ecosystems, and operations. Management considerations are summarized below:

- Parks with vegetation capable of burning will prepare fire management plans and address funding and staffing required by fire programs.
- Fire management programs will meet resource management objectives while ensuring protection of life and property.
- Fire plan development will include the NEPA compliance process and necessary collaborations with outside parties.
- Fires in vegetation are to be classified as wildland or prescribed fires and managed according to considerations of resource values, safety, and cost.
- Prescribed fires are ignited to achieve resource management goals and closely monitored to determine whether they successfully meet objectives.
- Parks lacking approved plans must suppress all wildland fires using methods that are the most cost effective while causing the least impact.
- Suppression in wilderness will be consistent with the "minimum requirement" concept.

NPS Management Policies (NPS 2001) also states: "Biological or physical processes altered in the past by human activities may need to be actively managed to restore them to a natural condition or to maintain the closest approximation of the natural conditions in situations in which a truly natural system is no longer attainable….The extent and degree of management actions taken to protect or restore park ecosystems or their components will be based on clearly articulated, well-supported management objectives and the best scientific information available. "

B. ENABLING LEGISLATION OF BIG BEND NATIONAL PARK

1. Big Bend National Park was created by the Establishment-Authorization Act (June 20, 1935, 49 Stat. 393, appended). This Act provides that "lands...as necessary for recreational park purposes...are hereby established, dedicated, and set apart as a public park for the benefit and enjoyment of the people." This act also stipulates that the provisions of the National Park Service Organic Act apply.

Further, the Establishment-Authorization Act required that lands for Big Bend National Park be secured only by public and private donations. Subsequent acts were passed on August 30, 1949 (63 Stat. 679), August 8, 1953 (67 Stat. 497), and December 28, 1980 (94 Stat. 3539). These acts authorized the Secretary of the Interior to acquire lands in certain sections of Brewster County, Texas, and to procure the remaining non-Federal land and interests within the boundaries of Big Bend National Park.

2. Big Bend National Park is named for its location on the deep 100-mile-radius bend in the Rio Grande in southwest Texas (Figure I-1). In authorizing a park in 1944, Congress recognized the area's rich biology, geology, cultural history, and outstanding recreational opportunities. International recognition of the park's resources came with a UNESCO Man and the Biosphere Reserve designation in 1976. Prehistoric sites dating back 10,000 years testify to the significance of the region to humans. European efforts to colonize this area began in the 1500s heralding tumultuous times as Europeans, Mexicans, and American Indians fought for control until the late 1880s. The park now hosts an average of 300,000 visitors annually from across the United States and from around the world. Visitors seek respite, scenic beauty, and recreational opportunities in the 801,163 acres of mountains, desert, and river, two-thirds of which is proposed wilderness.

C. PARK-WIDE DESIRED CONDITIONS AS THEY PERTAIN TO FIRE MANAGEMENT OBJECTIVES

The General Management Plan (2004), the Statement for Management (1992), and the Strategic Plan (1997), determine how Big Bend manages its resources. All plans recognize objectives directly related to comprehensive fire management. These documents emphasize the need for research to support management of natural resources, management across ecosystems, (which requires the cooperation of private, state and Mexican landowners), and the preservation and interpretation of the park's many scenic geological, biological, cultural and historical features. The provisions in this Wildland Fire Management Plan and the mitigation measures listed in the EA/FONSI and the US Fish and Wildlife Service Biological Opinion are consistent with these directions.

The recent revision of the General Management Plan (Big Bend National Park, 2004) reaffirms Wildland Fire Management practices. The GMP (2004) describes park goals to attain park-wide desired conditions:

- Restore native plant and animal populations in the park that have been extirpated by past human caused actions, where feasible.
- Whenever possible, natural processes will be relied upon to maintain native plant and animal species, and to influence natural fluctuations in populations of these species.
- Protect a full range of genetic types (genotypes) of native plant and animal populations in the park by perpetuating natural evolutionary processes and minimizing human interference with evolving genetic diversity.

The current Statement for Management recognizes the need to maintain the dynamic Chihuahuan Desert ecosystem while minimizing impacts on that system; the need to identify, research, and interpret the ecological, historical, and cultural resources of the area; and, the necessity of cooperating with neighbors in the public and private sector. The Strategic Plan identifies that one of the purposes of Big Bend National Park is to preserve and protect all natural and significant cultural resources and values.

D. RESOURCE MANAGEMENT PLAN OBJECTIVES AS THEY PERTAIN TO FIRE MANAGEMENT

The current Resources Management Plan (1995) addresses the Natural Fire Regime issue, acknowledges heavy accumulation of hazard fuels and focuses on the implementation of a Wildland Fire Management Plan. The Resource Management Plan (RMP) calls for a significant commitment to training fire personnel, hazard fuel reduction, fire monitoring and suppression, and research into fire effects from prescribed fires in the Chihuahuan Desert vegetation.

E. MEETING GMP AND RMP OBJECTIVES

This Fire Management Plan, a moderate revision of the 1994 plan, is based upon information gained from management actions taken on wildfires and prescribed fires, and from studies of fire history and vegetation community ecology. New technologies in fire science, as well as changes in National Park Service fire policy, are also incorporated into this revision. This plan will implement a broad range of fire prevention and suppression strategies to protect developments, visitor/employee safety, and cultural and natural resources at risk from Wildland fire impacts. Wildland Fire Use will be carefully implemented as a natural process of several park ecosystems. Prescribed fire will be implemented to

reduce hazardous fuels, and to conduct research, and restore ecosystems that benefit from the dynamic role of Wildland fire. Non-fire fuel treatments and emergency rehabilitation/restoration will be implemented to reduce hazard to values at risk from wildland fires.

III WILDLAND FIRE MANAGEMENT STRATEGIES

A. GENERAL MANAGEMENT CONSIDERATIONS

Big Bend National Park is within the Lincoln Zone (LNZ) of the Southwest Area. Five federal land management agencies and one state agency (FS, BLM, BIA, FWS, NPS and State of New Mexico Forestry Division) are participants with the Zone. The Lincoln Zone Interagency Fire Operations Plan is updated annually to establish operational guidelines, roles, and responsibilities for fire management programs in the LNZ and to comply with the most current federal wildland fire management policies and directives.

This Fire Management Plan is a strategic document that complements the annual LNZ Operations Plan. Consistent with the National Fire Plan, the core principles of the 10-year Comprehensive Strategy, as well as the annual Lincoln Interagency Fire Operations Plan and the General Management Plan for Big Bend National Park, this Fire Management Plan delineates fire management units and identifies appropriate fire management strategies within the units for the protection of life and property as well as preservation of natural and cultural resources. Wildland Fire Management priorities are set, accountability for actions is defined and collaboration with partners is considered.

B. WILDLAND FIRE MANAGEMENT GOALS

Big Bend National Park's fire management program goals and objectives are aligned with the Park's General Management Plan goals and the guidelines of the National Fire Plan. The fire management program goals and objectives are listed in descending order of their priority:

Table III-1 Goals and Objectives of the Big Bend Fire Management Plan

***GOAL 1*:** Protecting people and property is the highest priority of every fire management activity.

Objectives to achieve goal:

- Prevent injuries to the public, staff, and fire personnel.
- Reduce fuels that could threaten life and property using prescribed fire and mechanical or other non-fire fuel reduction methods.
- Prevent human-caused wildland fires through public education.
- Maintain safe egress from all areas of the park in case of fire.

GOAL 2: Apply wildland fire use, prescribed fire, non-fire fuel reduction measures, and fire suppression to accomplish natural resource management objectives.

Objectives to achieve goal:

- Determine the natural range of variability of the fire-return intervals.
- Determine desired conditions and condition classes for vegetation categories.
- Use fire as a restoration tool and/or as a maintenance tool.
- Monitor results of fire program activities and adjust management based on new knowledge.
- Where possible, ultimately allow fire to resume its natural role in park ecosystems.

GOAL 3: Apply wildland fire use, prescribed fire, non-fire fuel reduction measures, and suppression to accomplish cultural resource management objectives.

Objectives to achieve goal:

- Use prescribed fire to reduce fuels around sensitive sites.
- Restore and/or maintain cultural landscapes.

Take advantage of surveying opportunities during and after fire operations.

GOAL 4: Minimize unacceptable environmental impacts of fire program activities on natural and cultural resources.

Objectives to achieve goal:

- Properly plan each activity and conduct pre-action surveys.
- Carefully determine prescriptions.
- Suppress fires that fail to meet management objectives.
- Use minimum impact suppression tactics (MIST).
- Confer with resource advisors.

***GOAL 5*:** Cooperate fully with adjacent land management agencies and private landowners in the management of fire near park boundaries.

Objectives to achieve goal:

- Maintain communication and educate the park neighbors about the fire program.
- Formalize relationships and conduct joint fire management activities with neighbors.

GOAL 6: Coordinate fire activities with all park divisions, concessionaires, and the public.

Objectives to achieve goal:

- Maintain multiple lines of communication with all parties, in particular using the daily briefing sheet, website, and interpretive programs.
- Bring together structural and wildland fire planning operations.
- Incorporate appropriate fire management tasks into all park divisions.

By aligning with the Park's General Management Plan goals and the guidelines of the National Fire Plan, the six Fire Management Goals contribute to accomplishing national, regional and park-wide strategic plans. These plans include federal wildland fire policy, the core principles and goals of the Comprehensive Strategy, the Cohesive Strategy, the 10 year Implementation Strategy and land management planning for adjacent areas.

C. WILDLAND FIRE MANAGEMENT OPTIONS

1. Wildland Fire Suppression: Wildland fire suppression is an appropriate management response to wildland fire that results in curtailment of fire spread and eliminates all identified threats from the particular fire. All wildland suppression activities provide for firefighter and public safety as the highest consideration, but minimize loss of resource values, economic expenditures, and/or the use of critical firefighting resources.

Under this Fire Management Plan, approximately 23% of the Park is zoned for suppression to protect structures, historic resources, private lands, rare plant species, and lands where the flammability of the vegetation has been altered by invasive grasses. The decision to suppress a Wildland fire may be applied anywhere in the park, based on the current analysis by resource managers. Additionally, all human caused ignitions will be suppressed regardless of their location.

2. Prescribed Fire: A prescribed fire is any fire ignited by qualified park managers to meet specific objectives within a specific geographic location. A written, approved prescribed fire plan must exist and environmental compliance requirements must be met prior to ignition. Appropriate objectives include burns conducted for research or scientific purposes, reduction of hazard fuels, restoration of a natural process to fire-dependent plant communities, maintenance of a historic scene/landscape or removal of exotic plant species. Prescribed fire may be used throughout the park.

3. Wildland Fire Use: Wildland fire use is the management of naturally ignited wildland fires to accomplish specific pre-stated resource management objectives in pre-defined geographic areas outlined in this Fire Management Plan. Operational management is described in the Wildland Fire Implementation Plan (WFIP), Appendix K. The WFIP is an expandable document that is prepared for each fire use incident. This option relates to the land and resource direction to allow natural processes and maintain a dynamic ecosystem. Wildland Fire Use is a management option for approximately 77% of the park lands.

4. Non-fire Treatments: Non-fire treatments for fuels include mechanical, chemical, biological and manual methods. These treatments may be used individually or as a phase of multiple treatment methods to achieve resource benefits and managements goals such as hazard fuels reduction, ecosystem restoration, and maintaining ecosystem health.

Mechanical fuel reduction is identified for implementation in this Fire Management Plan. Mechanical fuel management uses hand and/or power tools

to cut or remove live or dead vegetation to decrease either the volume or flammability of the fuels. Fuels treatments are planned activities that are conducted before a fire occurs in order to reduce fire risk. The various fuel treatments proposed in Big Bend National Park are hazard fuel reduction immediately adjacent to park owned structures, including concessionaire-operated facilities, adjacent to campsites, roads, cultural resource sites and along prescribed burn unit perimeters.

The Park may also incorporate hazard fuel reduction and fire preparedness requirements into various permits and agreements that involve structures inside of Big Bend National Park. Examples include boundary fence, utility rights-of-ways and communication sites, as well as the research and education facilities operated by universities. Private or public in-holdings located within the Park that are not legally subject to permits or agreements cannot be required to adhere to hazard fuel reduction. To encourage such owners/operators to voluntarily implement fire prevention measures, the Park will implement a fire prevention and education campaign and work with property owners and residents to reduce fuel hazards.

The Park has no plans to employ biological means to reduce fuels. This includes the use of cattle or other introduced grazing animals.

The use of herbicide for fuel reduction treatments will be considered in separate planning and compliance documents such as the Vegetation Management Plan.

D. DESCRIPTION OF WILDLAND FIRE MANAGEMENT STRATEGIES BY FIRE MANAGEMENT UNIT

A Fire Management Unit (FMU) identify an area of the Park that is assigned different fire management objectives and strategies based on management constraints, fire regime, and the human, natural, and cultural resource values to be protected. By designating Fire Management Units, decision-making processes regarding the use of fire and fire suppression are simplified for the Incident Commander and/or Fire Program Manager.

There are three Fire Management Units within Big Bend National Park. Appropriate fire management objectives and strategies within each Unit are based on condition class, vegetation type, known fire history, behavior and effects, resource concerns, accessibility, and proximity to developed areas, private property and homes. One key variable in the delineation of fire management units is the application of Wildland Fire Use in FMU #2. Virtual boundaries exist between FMU #1 and #2 due to the locations of values to be

protected. An assessment of the values at risk will determine how the ignition will be managed. FMU #3 has a delineated boundary.

Common to the all units, every unplanned human-caused ignition (different from planned prescribed fire) is suppressed. Firefighter and public safety, protection of property, and responsible stewardship of all resources are primary concerns in the consideration of tactical or operational fire management efforts in all Fire Management Units.

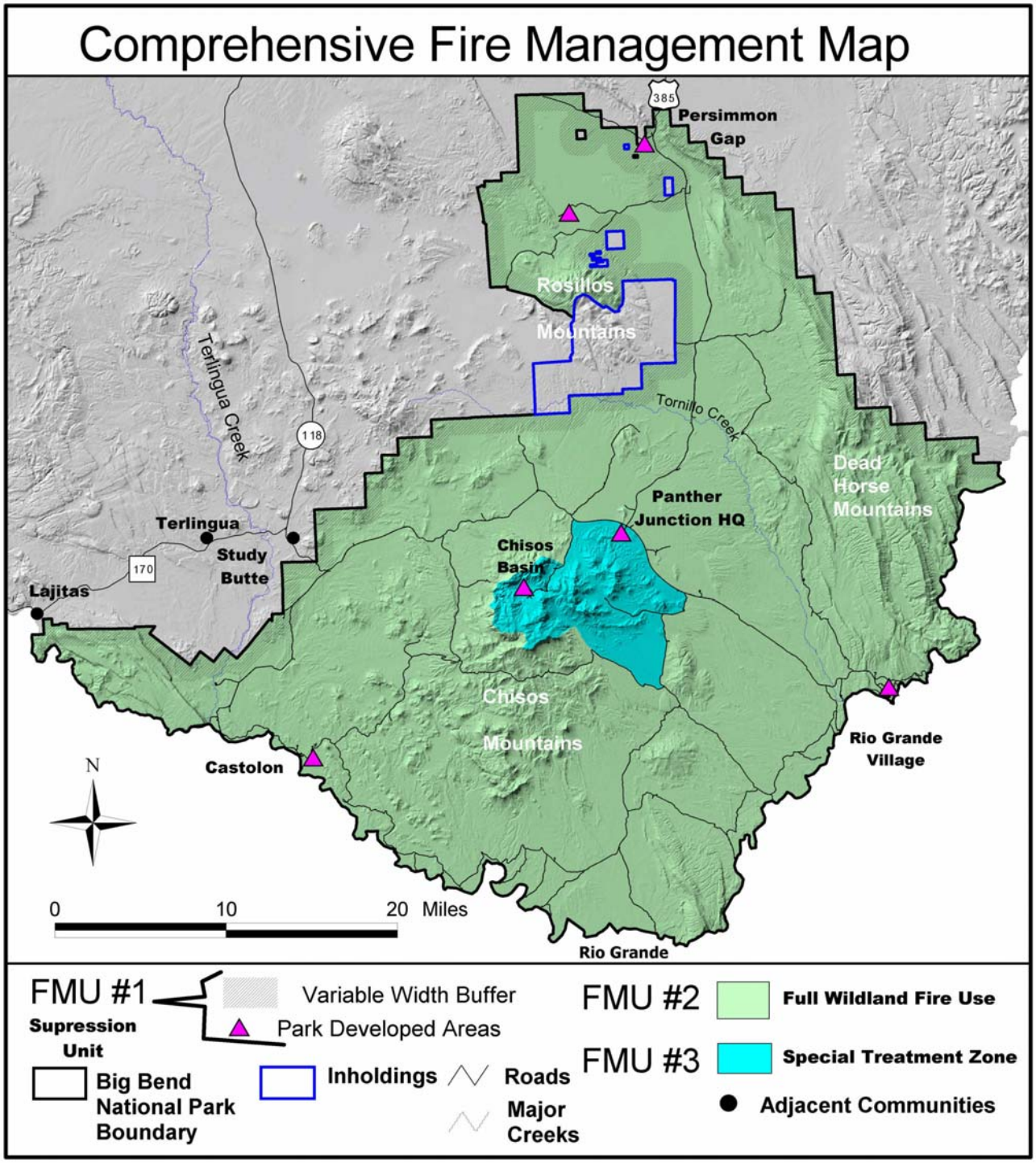

Figure III–1 Comprehensive Fire Management Map.

1. **Fire Management Unit #1:** FMU 1, designated as the Suppression Unit, contains approximately 187,300 acres (23%) and includes developments, utility corridors, fire-susceptible cultural resource sites, legally protected species and habitat, private in-holdings and a variable-width suppression buffer along park boundaries.

The strategy for managing fire in FMU #1 is to suppress all fires using methods necessary to confine, contain, or control, as deemed appropriate by the designated Incident Commander. All fires in FMU #1 will be extinguished using an appropriate management response in a manner that causes the least damage to resources, persons, and property. Due consideration will be given to cost-effectiveness of the suppression action(s) chosen.

a. Physical and Biotic Characteristics of FMU #1:

Developed Areas, Utilities, and Private Lands: Approximately 1341 acres are developed in the park and considered Wildland-Urban Interface areas, including five visitor service locations; Persimmon Gap, Panther Junction (Park Headquarters), Chisos Basin, Castolon, and Rio Grande Village. Isolated structures such as Maverick Entrance Station, Harte Ranch, K-Bar Ranch and Barker Lodge, as well as all private land in-holdings are included. Approximately 24, 470 acres are privately owned and within the park boundary. Ninety-five miles of power line roads access 86 miles of power lines that cross through the park. Telephone lines are underground located along the shoulders of park roads.

Cultural Resources: There are more than 1650 sites in a cultural site database at the park, and new sites are added as they are found. Currently, less than 3% of the park area has been surveyed. Based on a NPS system-wide Archeological Site Estimation Project in 2002, the NPS has estimated that Big Bend National Park contains more than 26,000 archeological sites dating from 8000 B.C. to "the Historic Period." Any activity that alters the original condition of the site or the cultural materials within it potentially reduces the scientific values that may qualify the site for the National Register. Protecting archeological context is the most important consideration.

Legally Protected Species: Protecting federally listed species requires careful precautions to safeguard individuals, populations, and their habitats over the long-term. The park supports many animal species, but staff considered only those that for reasons of population size, federal protection, or limited habitat, needed special consideration in this FMP. A list of these species can be found in the Biological Assessment. The appropriate protection measures are found in the Biological Opinion.

Boundary Buffer: Agreements are being negotiated with neighboring agencies and large landowners to shrink the standard

fire suppression buffer (1 mile) to a variable limit that allows fire to burn to natural or manageable boundaries such as the river, roads, bare areas, and cliffs both in the park and beyond. The expected benefits include more cost-effective use of fire management resources, safer fire management practices, and less damage to soils and vegetation from suppression activities. The Rio Grande forms the park boundary for 118 miles. This international boundary fire suppression buffer contains 75,520 acres. The administrative boundary on the Northeast and Northwest is approximately 145 miles and the buffer area includes approximately 85,953 acres.

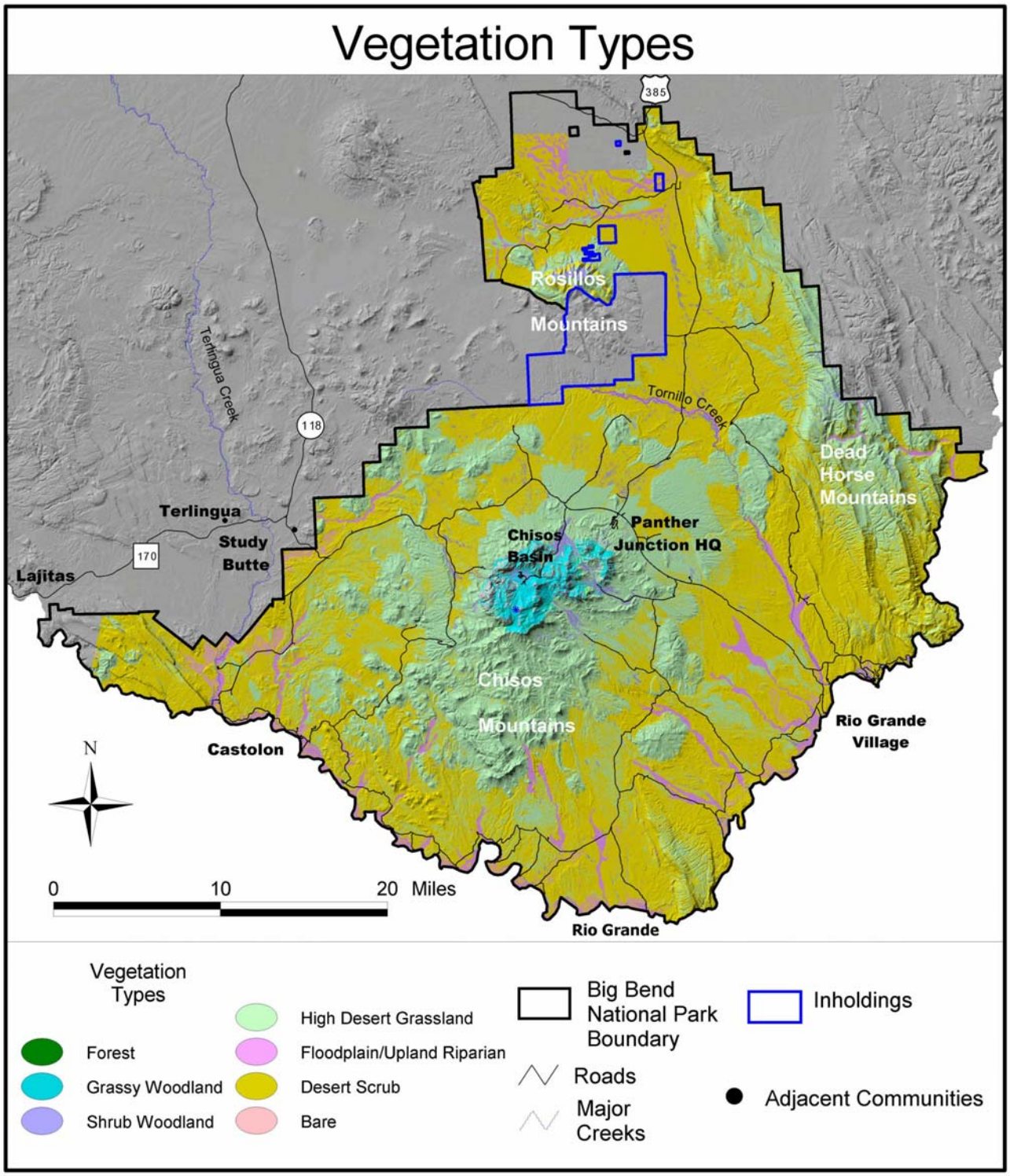

Figure III–2 Vegetation Map

Vegetation Categories of FMU #1:

1. Floodplain/Upland Riparian (occurs in FMU #1 and #2): Two cover-mapping categories, Mixed Riparian and Desert Willow from Plumb (1993), form this vegetation category. The Rio Grande, with a high water table and dependable water year round, supports considerable stands of vegetation. Although this category comprises just 3% of the park, this vegetation type forms a vital lifeline for animals and humans. Historic photos taken in 1901 show a mostly denuded riparian corridor (Schmidley 2002). The erosive force of frequent floods kept the river clear of reed beds and promoted scattered gallery forests of cottonwood and willow with open floodplains of mesquite, acacia, screw bean, desert willow, and *Baccharis* spp. Several upstream dams in Mexico and New Mexico now capture floodwaters. Fire would have been uncommon prior to humans with lightning ignitions extinguished by high humidities and fuel moistures during summer. Understory was probably sparse. Now, fire can be supported with increased ground and ladder fuels from exotic species, which recover faster after fire than the natives. Fire is more frequent year-round from abundant human visitation and carelessness with campfires.

Upland Springs: Springs, seeps and tinajas provide precious waters for wildlife and are found throughout the mountains and low elevation desert. They were claimed by ranchers and exotics gradually became established. Now park staff is systematically removing salt cedar from springs and seeps allowing natives to reestablish.

Common species: Floodplain - cottonwood, honey mesquite, screw bean, willow, desert willow, *Acacia* spp., shrubby groundsel, burro bush, common reed; exotics include salt cedar, giant reed, Bermuda grass, and buffelgrass.

Upland springs – overstory varies with site; oaks and junipers at higher elevations; some willow and cottonwood and small tree species at lower sites; alkali sacaton, deer muhly and riparian forbs are common in the understory. Salt cedar occurs at some sites and is dominant in places.

Floodplain - Upland Riparian has the following characteristics:

- Present structure: The floodplain is vegetated with dense stands of nonnative salt cedar and giant reed thickets along the shore. The historical intermittent gallery forests of native

cottonwoods and honey mesquite *bosques* believed to exist prior to Europeans are found in small patches (Schmidley 2002). Native understory includes *Baccharis* spp. and scattered native grasses. Introduced Bermuda grass and buffelgrass are dense where sun and moisture are present. Upland Spring's dominant vegetation varies by spring; most salt cedar has been removed.

- Fire Regime Condition Class: Floodplain –III; Upland springs to I- II (designation depends on whether they have they recovered from grazing impacts and if exotic salt cedar has been removed); Lower reaches of drainages –II; Headwaters of drainages –I
- Condition on recent burns: Wetlands: Rio Grande Village burn (February, 2003) of high severity has shown high recruitment of cottonwood seedlings in ash beds. Other areas required additional plantings. Response to fire in the giant reed suggests regular burning at 5-yr intervals to reduce risk. Floodplains: Jewell fire (April, 2002, 88 acres) between Mariscal and Santa Elena- arson set fire burned ~ 300 year old mesquite *bosque*, which is re-sprouting. Bermuda grass has responded vigorously after fire. San Vicente fire (2000, 27 acre) removed native overstory and salt cedar; both types of vegetation are re-sprouting. Upland springs: The history of exotics at springs suggests that fire may remove native overstory giving competitive advantage to more fire tolerant exotics. Other controls are necessary following fire at springs.
- Fuel model: Floodplain –8 (Slow-burning ground fires with low flame lengths. The fire-supporting layer is composed of compact leaf litter, needles, leaves and twigs).

Upland Springs – 3 (Fire is carried through tall grasses where one-third or more are considered cured or dead. Highest intensity of the grass fires, especially under wind.)

- Fire Cause and Frequency: Natural fire uncommon with high relative humidities and fuel moistures, wet soils. Human caused fires are common along the river.
- Insect/disease: None seen at present.
- Problem invasives: Large sections of the riparian corridor have salt cedar, with giant reed prevalent where the waters slow; buffelgrass established in upland arroyos.

Management considerations: The major goals are to have scouring floods restored (beyond the control of park administration), and to contain and remove exotics, gradually restoring native vegetation.

Floodplain: Staff is planning to contain exotics; initiate pilot restoration of natives; use fire when it occurs as part of an integrated restoration program for native species which may include sowing seed in ash beds and applying herbicide to freshly cut stumps of salt cedar; and, to protect mature cottonwoods from fire by shielding the trunks. Seedlings may need protection from rabbits and rodents as well as Mexican livestock, which ignore the international boundary. Salt cedar will be removed from arroyos as resources are available. Monitoring and photos will capture changes in exotic cover along the floodplain and arroyos associated with restoration projects and control of exotics.

Wetlands: Staff proposes burning giant reed on a 5-year rotation to reduce high-intensity fire threatening endangered species habitat in selected localities.

Upland springs: Exotics will continue to be removed over time; mature native overstory species will be protected from fire wherever possible.

3. Scrub Desert (occurs in FMU #1, #2 & #3): This vegetation category was compiled from five cover-mapping categories from Plumb (1993): Creosote-Lechuguilla-Grass, Creosote-Lechuguilla-Prickly Pear, Creosote-Tarbush, Creosote-Yucca-Grass, and Lechuguilla-Candelilla-Hetchia. Scrub Desert is dominated by shrubs (creosote, mariola and ocotillo) and succulents (prickly pear, lechuguilla, and Texas hetchia or false agave). Grasses are subdominant and provide insufficient fuels to carry fire. Scrub Desert occurs over half the park between the low-lying floodplains at 1,700 ft to mid-elevation desert grasslands at 3,000 ft. Average annual precipitation of 8-12 inches falls mostly in summer with high rates of evaporation.

Common Species: Creosote, tarbush, lechuguilla, mariola, prickly pear, candelilla, hetchia, tobosagrass, sacaton, chino grama.

Scrub Desert has the following characteristics:

- Present structure: Sparse desert shrubs, succulents and grasses. Grasses are unlikely to carry fire in this category but high winds may carry fire through shrubs. Scrub Desert

is unlikely to be a fire-maintained association because of the paucity of grasses. In the past, there were more grasses, including dense flats of tobosagrass on Tornillo Flat, and other playas, and fire may have been more common.

- Fire Regime Condition Class: Where native shrub and succulents dominant –I (across most of the park); Arroyos invaded by exotics –II; Exotic grasses dominant –III. There is the risk of changing fire-regime because these exotics respond more vigorously after fire than natives.
- Condition on recent burns: A prescribed burn in Comanche Draw, 6 miles south of Persimmon Gap in February 2003 (537 acres) showed a slight increase in grass cover from 1% in control plots to 2.5% in treated plots (McKernan 2003). Only one of the past two years of above average monsoon precipitation was included in results and grass recovery may be higher over the next year.
- Fire Cause and Frequency: Lightning ignited fires are infrequent and usually do not carry far because of fine discontinuous grassy fuels (10-13% cover). Fire may carry through the shrub layer under high winds.
- Fuel model: 1 (Fire spread is governed by fine, porous, and continuous herbaceous fuels that are almost cured. Typical of grasslands and grass-shrub assemblages and has high rates of spread.)
- Insect/disease: No problem areas at present.
- Problem invasives: Buffelgrass is colonizing arroyos that lead into the Rio Grande (Guertin 2004) converting shrub-dominated areas to highly flammable grasslands.

Management considerations: Major goals are to let natural fires burn within prescriptions and to use research burns to understand how fire may aid restoration of grasslands, particularly tobosagrass and sacaton. Desert Scrub is the buffer zone to keeping buffelgrass out of high desert "sotol" grasslands. Developing methods to aid grass establishment may help curb buffelgrass infestation. Growth of grasses following fire in 2003 at Comanche Draw shows that sites that increase moisture retention may increase recruitment of grasses in above average summer rainfall years (McKernan 2003). Options for buffelgrass areas are to suppress, or to burn and follow up with additional controls.

4. High Desert Grasslands (occurs in FMU #1, #2 & #3): This vegetation category has the most species per unit area in the park. High Desert Grasslands cover about 40 percent of the park ranging from 3,000 to 5,000 ft in elevation with scattered plants

occurring in the heights of the Chisos. Annual rainfall is 10-16 inches with most occurring in summer. Lightning caused fires are common in this category and dependent on understory fuels. High Desert Grasslands can support large fires (>1,000 acres) with sotol and yucca acting as receivers of lightning strikes and spreading fire as they roll downhill. Biological surveyor Vernon Bailey reported in 1901 that "Luxuriant grass covers almost the whole of the mountains …," suggesting more frequent fire at low and moderate intensities that maintained open canopies and grassy understory (Schmidley 2002). The grasslands contain some shrubs and low-growing trees, with cacti largely confined to drainages that supported little grass and to areas of rocky and shallow soils (Humphrey 1958). After 60 years without livestock, grasses in this category appear to have recovered from grazing.

Common Species: Lechuguilla, prickly pear, bear-grass, sotol, toothleaf goldeneye, yucca, skeletonleaf golden-eye, ceniza, *Acacia* spp., *Dalea* spp., grama grasses (Chino, blue, black, hairy and sideoats), tanglehead, Mexican lovegrass, California cottontop, green sprangletop and threeawn, tobosa grass and alkali sacaton. Shrubs are found on drainages in deeper soils, with grasses, sotols and succulents found more on ridges and shallow soils. Exceptions are tobosagrass and sacaton which are found on deep clay soils in undrained basins.

High Desert Grasslands have the following characteristics:

- Present structure: Grasses are widespread on well-drained igneous soils and now support landscape-scale fire (>1000 acres). Without fire, shrubs will increase onto shallow soils on slopes and ridge tops outside what may be their normal range in canyon bottoms.
- Fire Regime Condition class: I -with some shrub encroachment.
- Condition on recent burns: The Gap fire (1992, 2412 acres) at mile marker 4 on highway 118– showed considerable decrease in lechuguilla, recovery of grasses, and increased diversity; Sotol Vista fire (1991, 680 acres) caused by lightning shows recovery of grasses and shrubs, with catclaw and mesquite re-sprouting slowly; Estufa fire (1994; 3,774 acres) near Panther Junction needs to be compared with equivalent unburned area to document fire effects.
- Fire Cause and Frequency: Caused by lighting; fire frequency estimated to be 7-10 years (McPherson 1995)

- Fuel model: 2 (Fire spread is from fine cured herbaceous fuels in addition to litter and downed stemwood. Open shrublands, scrub oak and some juniper-pine assemblages fit this model.)
- Insect/disease: None present.
- Problem invasives: Buffelgrass and Lehmann lovegrass have established in some high desert grassland habitats. King Ranch bluestem has become common on roadsides.

Management considerations: Major goals are to maintain and stimulate plant diversity, allow natural burns within prescriptions, shrink shrub encroachment along the grass-woodland ecotone, and develop natural firebreaks wherever possible.

Grasses have recovered sufficiently from grazing to carry landscape-scale fires. Grazing and then drought (7 years following park establishment) allowed shrubs to out compete grasses. Several burns may be necessary to incrementally remove shrubs from shallower soils on slopes and ridge tops allowing reestablishment of grasses. Ideally incremental fires will cause shrubs to retreat to deeper soils along drainage lines and at the grasslands woodlands ecotone. Monitoring will detect changes in species diversity and fire effects, and photos can help document shrub encroachment.

The invasive exotic, Lehman lovegrass, posses a threat by displacing native species, increasing fuel loading, intensifying fire behavior and increasing fire frequency. Experiments with and without herbicide following fire are proposed for the 1314 burn site, where Lehman lovegrass could contribute a large amount of fine fuel. Photos and other appropriate vegetation metrics (cover, density or biomass) as determined by the Fire Effects Monitoring Plan will be used to document fire effects in natural burns and for selected prescribed burns.

5. Shrub Woodland (occurs in FMU #1, #2 & #3): This vegetation category contains three cover-mapping categories from Plumb (1993). These are Mixed Scrub, Oak Scrub, and Mixed Oak-Shrub Woodlands. This category includes many different shrub-dominated communities scattered in the foothills and mountains of the Chisos Mountains and Dead Horse Mountains. Elevation is from 4,500 ft at Green Gulch to 5,500 ft near the Chisos Basin. Annual precipitation averages 12 to 16 inches.

Common species: Low growth gray and Emory oak, catclaw acacia, catclaw mimosa, bee bush, slimleaf vaquelinia, evergreen sumac, shorthorn jefea, and low-growth redberry (also known as Pinchot juniper) and alligator junipers.

Shrub Woodland has the following characteristics:

- Present structure: The occurrence of shrubby thickets may be associated with human disturbance or higher precipitation at increasing elevation. Catclaw acacia and bee brush thickets are densest where stock camps, stock pens and homesteads were located. Evidence of grazing suggests that fires were also suppressed allowing juniper, piñon and oak to increase and canopies to close. These woody fuels and thickets are generally not near ridge tops or areas conducive to lightning and have suppressed understory fine fuels, limiting the spread of fire. Fires are most likely to occur when high winds drive a grass fire into these areas.
- Fire Regime Condition Class: II
- Condition on recent burns: Blue Creek (1989, 334 acres) human caused, burned the scattered overstory of piñon and juniper at high intensity causing high mortality; scrub oak and shrub re-growth is very thick and grasses have responded strongly.
- Fuel model: 6 (Fire carries through the shrub layer at moderate wind speeds but drops to the ground at lower speeds and at breaks in the canopy.)
- Fire Cause and Frequency: Lightning prior to monsoon. Probably frequent surface fires that kept canopies open, maintained grassy understory and limited stand density, estimated 10-30 years (Kaib et al. 1996).
- Insect/disease: Some areas of oaks stripped in 1999 and 2000 by variable oakleaf caterpillar. Mild winters accompanied by drought stress possibly caused death of the trees.
- Problem invasives: Buffelgrass has established at the Chisos Basin, demonstrating adaptation to lower temperatures than has been recorded. Global warming trends may lead to its establishment in burned areas during mild winters.

Management considerations: Major goals are to keep natural ignitions within low and moderate intensities; protect the habitat of federally listed species'; restore areas heavily impacted by grazing in Green Gulch and Oak Canyon; and, create a plan for managing fire moving upslope from high desert grasslands. Fires would thin

juniper and piñon saplings and reduce shrub cover. Results from monitoring would shape future management decisions. Monitoring will capture fire effects, condition of habitat for federally listed species, and cover of bee bush and prickly pear where heavy livestock use occurred.

b. Fire Management Objectives: The following Fire Management Plan objectives apply to FMU #1:

Protecting people and property objectives:

- Prevent injuries to the public, staff, and fire personnel.
- Reduce fuels that pose a threat to life and property using prescribed fire and mechanical fuel reduction methods.
- Prevent human-caused wildland fires through public education.
- Maintain safe egress (by hazard fuel reduction, fuel breaks, etc.) from all areas of the park in case of fire.

Natural and Cultural resources objectives:

- Properly plan each activity with resource managers
- Conduct pre-action surveys.
- Carefully apply burning prescriptions.
- Suppress fires that fail to meet management objectives.
- Use minimum impact suppression tactics [MIST].
- Confer with resource advisors.
- Take advantage of surveying opportunities during and after fire operations
- Restore and/or maintain cultural landscapes.
- Use prescribed fire to reduce fuels around sensitive sites.
- Fire Management activities are conducted in accordance with applicable terms and conditions established in the Biological Opinion issued by the U.S. Fish and Wildlife Service.

Park boundary objectives:

- Maintain communication with park neighbors and educate communities about the fire program.
- Formalize relationships and conduct joint fire management activities with neighbors.

c. Management Considerations: Specific management considerations are outlined for each vegetation type in the vegetation type description. Additionally, there are no in-holdings

at risk from wildfire in Fire Management Unit #1 because of the sparse vegetation surrounding them. Structural fire protection is managed by NPS personnel within the park. Wildland fire engines will provide wildland exposure protection and assist with water delivery as requested.

Structural fire protection to in-holdings may pose problems due to long suppression response times by Brewster County and insufficient water supply and water pressure. Risk of wildland fires resulting from structural fires is probably not significant, as fuels to carry fire are generally sparse plus structures are surrounded by cleared areas, roads, and other barriers to fire.

d. Historic Role of Fire: Mild winter and early spring temperatures, comfortable relative humidity levels, abundant sunshine, and lack of rain produce ideal conditions for maximum outdoor activity, resulting in Big Bend's main visitor use season, March 1 through Spring Break-Easter. A late winter/early spring "green-up" may occur providing that winter precipitation has been adequate. However, an abundance of cured vegetation may likely be available as a result of the previous year's growth. All of these variables--available vegetation (fuels), visitation patterns, and seasonal weather conditions--account for the first peak of fires evident in the data.

An assessment of fire reports from 1980 indicate the majority of human-caused ignitions were less than 0.1 acre in size and started near the main roads in or adjacent to the developed areas, primarily Chisos Basin and Panther Junction. Natural ignitions clustered in the higher elevation areas in the Chisos - Sierra Quemada – Deadhorse Mountain ranges, and varied in size from 0.1 to 0.5 acre in size. A few natural starts, which developed into wildfires larger than 1000 acres (April/May, July), occurred in the High Desert Grasslands. In general, smaller fires occurring along roadways were wildland exposures resulting from car fires in areas of light or previously burned fuels, so spread was minimal. Natural ignitions burned in mid elevation areas where fire spread was contained by sparse fuels or natural barriers. Large fires were driven by frontal or thunderstorm winds and easily controlled only after winds subsided and/or rain ensued. Since 1980, Big Bend National Park averages 15.3 unplanned ignitions/year with 1.3 fires exceeding 100 acres/year.

Table III-2 Fire from 1946 - 2004 by Size Class, Month, and Ignition Source.

> 1000 acres				2	2		5						Human Lightning 9 MIPF
100 - 999 acres		1	4	2 1 1	1 5	2	5	1					Human 7 Lightning 14 MIPF 2
10 - 99 acres	1	2 2	1 1	2 3	1 7 1	1 3	4 1	1	1 3 1	2			Human 10 Lightning 18 MIPF 10
1 - 9.9 acres	1 3	4 3	9	8 2 1	4 15 2	3 12	1 16 2	2 6	6 4	2	2	1	Human 43 Lightning 55 MIPF 11
0 - 0.9 acres	9	11 2	23 10	26 36 1	13 69	11 45 2	8 35	2 15	2 7	6 10 1	6	5	Human 122 Lightning 229 MIPF 4
Monthly Totals >	Jan (14)	Feb (26)	Mar (48)	Apr (87)	May (127)	Jun (82)	Jul (79)	Aug (29)	Sep (24)	Oct (21)	Nov (8)	Dec (6)	
Unknown acres		1		1 1	5 2	3	1 1	1 1					Human 12 Lightning 5 MIPF

Fire Ecology and Fire History: The effects of fire were investigated on higher elevation vegetation in the Chisos, and lower desert scrub and grasses. Researchers have sought to identify pre-European fire frequency by identifying fire scars in tree rings. Moir (1982), in reconstructing fire history of the Chisos Mountains, found 10 tree-scarring fires in Boot Canyon and the Southeast Rim with fires between 9 and 60 or more years apart conservatively estimating a fire-return interval of 70 years. In a study of 63 woodland sites throughout the southwest from 1700, Swetnam and Baisan noted fire return intervals of 1-89 years with a mean of 25 years (1996). In the Guadalupe Mountains Ashlstand (1981) noted mixed conifer forest averaged fire every five years from 1554-1842. In an effort to clarify fire trends for this region, Helen Mills at Yale University is currently undertaking a comparative study by of the Davis, Chisos and the Sierra Del Carmen Mountains to reconstruct historic vegetative structure and fire frequency. When resource managers know the historic range of variability for fire, they can identify restoration processes for small changes, or accept a type conversion.

The last sizable fire in the Chisos was in 1903. Lack of fire is attributed to grazing (from 1880s to 1940s), drought (in 1890s and 1950s especially) and suppression (since grazing) which promoted shrub growth over grasses. That grasses once carried fire into the Chisos is suggested by government biological surveyor Vernon Bailey, who wrote in 1901, "Luxuriant grass covers almost the whole of the mountains…." and "Oaks, pines and junipers are the dominant trees…" suggesting frequent low-intensity fire, which kept woodlands open (Schmidley 2002:350). The current non-flammability despite high fuel loads may reflect the topography of sheer cliffs, talus slopes and rocky terrain. The change of carrier fuels in forest areas from grasses to leaf litter, ladder, dead and downed fuels and small trees, will mean hotter fires, and may hamper efforts to maintain burns within prescriptions (Fule, et al., 2004). The abundant high desert grasses noted by the surveyor Bailey have taken 60 years without livestock to recover and could carry landscape scale fire into higher elevation woodlands and forests. McPherson (1995) estimates fire return intervals in desert grasslands at 7- 10 years, but this may need tempering to local fuel conditions.

The lower elevation desert contains mosaics of shrubs and grasses, and mixes of both depending on landform. Conditions prior to grazing can only be inferred. Mule train owners cut Chino grama,

and perhaps tobosagrass to feed their animals (Gomez, 1991). Langford and Gipson described grasses as abundant "knee deep to a horse…only the tallest of the desert plants stood out above it" (1952). Other inferences by Tyler (1975), and Fulcher (1959) referred to periodic abundant grass and although these ranchers lacked scientist's trained eyes, they knew grass turned cows into money. Overgrazing led to sheet and rill erosion, channel cutting and conversion to more drought tolerant shrubs rather than perennial grasses. Muldavin, et al. (2001), examined vegetative changes in the park from 1955 to 1996 on 5 soil types and estimated it takes from 25-40 years for overgrazed sites to recover comparable vegetation, with recovery highly dependent on moisture.

That fire is the primary shaper of these ecosystems is debated. Hastings and Turner (1965) point to the paucity of fire in desert grasslands and the influence of other agents including human activity, climate, soils, drainage patterns, and rodent effect on seed sources – in shaping vegetation. Cornelius (1988) noted that recovery of desert shrubs after fire often exceeds that of dominant perennial grasses. A prescribed burn in 2003 in the northeast of the park however showed a slight increase in grasses within a year. Above average precipitation in the growing season and availability of seed sources may lead to greater establishment of grasses (Drewa and Havstad 2001; McKernan 2003; Muldavin, et al., 2001). Fire is expected to be infrequent in these low biomass/ density assemblages where landform shapes moisture conditions (Wondzell, et al. 1996). The shrub to grass ratio is dynamic, shaped primarily by moisture (Muldavin, et al., 2001) and then by fire and other agents.

The fire history data and precipitation records from 1948 to 2003, suggest that there is strong relationship between the amount of area burned in Big Bend National Park and the adjacent surrounding area and the amount of precipitation received in preceding years. Grass is the primary carrier of fire at the park and the amount of grass increases with increasing precipitation. In drought years grass production is low and any grass grown in a preceding wet period will decrease thus limiting fire spread. However, during wetter periods more grass is produced and the ability of fire to spread increases (Figure III-3). The drought of the 1950s and the most recent drought of the late 1990s resulted in limited burned area. In contrast, the wet period of the last half of the 1980s resulted in several years where more than 1000 acres were burned. Notably, when the 5-year average precipitation exceeds 20.9 inches (Chisos

Basin) then the chance of burning more than 1000 acres is greater than 50% (Table III-3). While precipitation is a major driver for vegetation dynamics in desert environments, it is also a major driver for fire dynamics. The interrelationship of these two forces of nature is not well understood and will require further study to more fully understand fire's role in structure and function of desert vegetation.

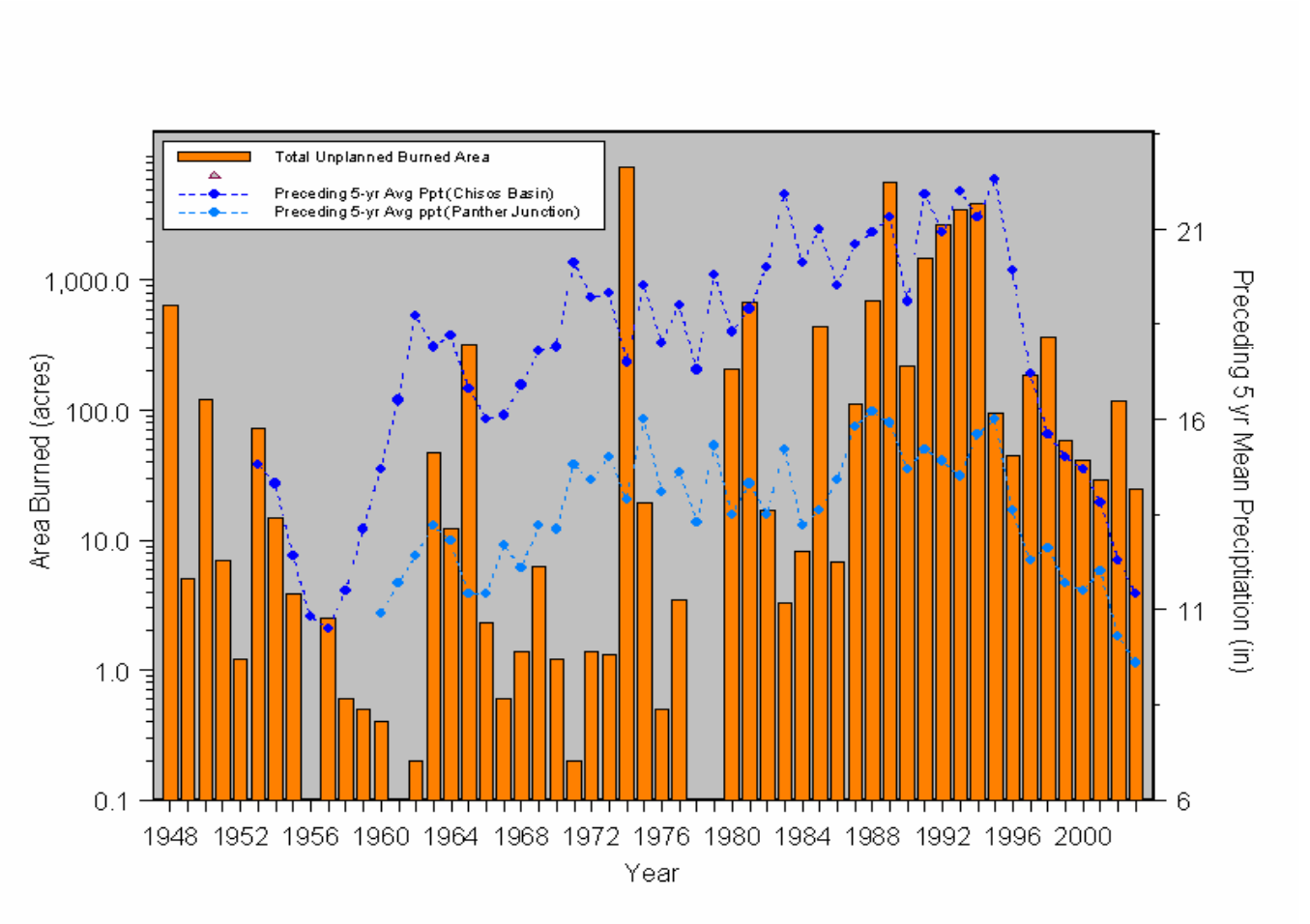

Figure III–3 Plot of the burned area for each fire year from 1948 to 2003 and the preceding 5-yr average precipitation. Each bar represents the total area burned in acres from all unplanned starts (Human and lightning) for that year. The two dotted lines are the preceding 5-yr average precipitation for the Chisos Basin (5400 ft elev.) and Panther Junction (3750 ft elev.) for that year. For example the precipitation value plotted for the fire year 1987, is the precipitation values averaged over the preceding 5 year period, 1982 to 1986.

Table III-3 Probability of occurrence for total burned area for Big Bend National Park and the adjacent surrounding area given the 5 year average precipitation preceding any given fire year.

Fire Year Burned Area (acres)	Preceding 5-yr Average Precipitation (inches)		
	<14.0 (n=6 yrs)	**14.0 to <20.9 (n=33 yrs)**	**≥20.9 (n=9 yrs)**
<10	57%	47%	11%
10 to <100	29%	28%	11%
100 to <1000	14%	22%	22%
≥1000	0%	3%	56%

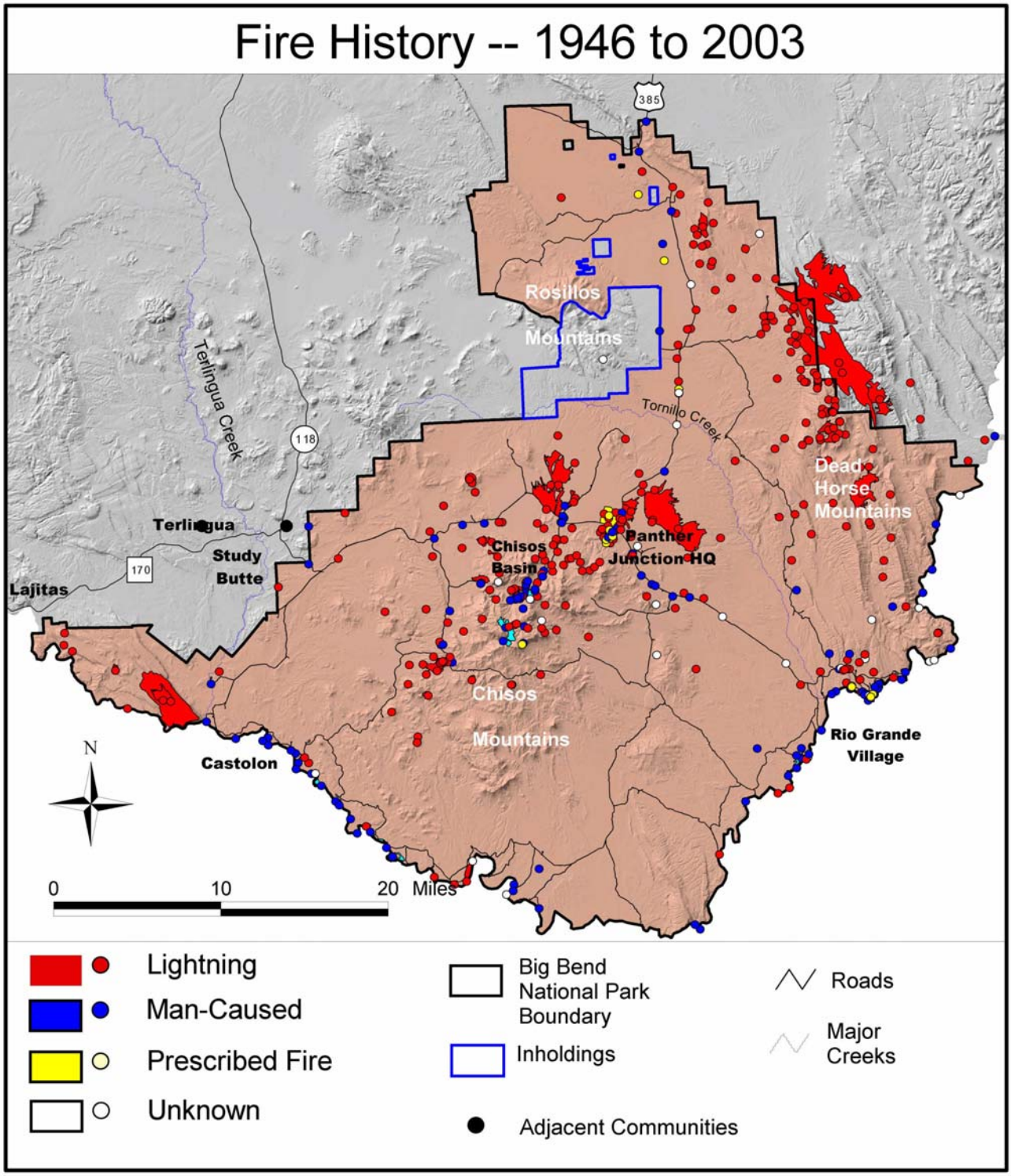

Figure III-4: Map of Fire History

e. Wildland Fire Management Situation

1) Historical Weather Analysis: The modern climate of the park is arid, with average annual precipitation ranging from less than 8 inches at the lower elevations to more than 19 inches in the higher montane elevations. Precipitation generally increases with elevation. Most rainfall occurs in the form of thundershowers during the months of July, August, and early September. During this period, locally heavy thunderstorms and flash flooding can occur. Summer storms bring higher humidities and a cooling effect which reduces temperatures.

Winter is the dry season, with precipitation averaging less than one-half inch per month. Snow occasionally falls during January and February, but rarely in great amounts. It infrequently lingers on shaded northern aspects. Occasionally, blustery "northers" may sweep the area November through April. These fronts may be accompanied by chilling winds and blowing dust. Strong winds are generally associated with weather fronts and thermal activity. The weather is more settled after mid-April. During fall, the flow of moisture from the Gulf of Mexico is interrupted by invasions of cooler, drier polar air masses. Average monthly temperature and precipitation measurements taken from Panther Junction weather station are shown in Table III-4. This table represents the general climate at the park's median elevation. Temperatures in the higher mountain areas vary about 5 to 10 degrees below those shown in the table, while temperatures along the Rio Grande run from 5 to 10 degrees higher. Wide variations of weather can occur across the park. Spatial and temporal variations of climate are a factor in determining the park's fire season, as discussed later.

Table III-4 Average Temperature and Precipitation Panther Junction Weather Station, Elevation: 3,750 feet

Month	Average Temperature (°F) Maximum	Minimum	Average Precipitation (in)
January	61	35	0.46
February	66	38	0.34
March	74	45	0.31
April	81	52	0.7
May	88	59	1.5
June	94	66	1.93
July	93	68	2.09
August	91	66	2.35
September	86	62	2.12
October	79	53	2.27
November	69	42	0.7
December	62	36	0.57
		Total:	15.34

As the spring season advances, average temperature increases substantially through late May and June, the hottest months of the year. The average June maximum is 94.2°F at Panther Junction, with a distinct gradation of higher temperatures as elevation decreases. Daily Rio Grande Village temperatures generally run over 100°F. As local weather systems become more active, isolated storm cells develop with increased lightning activity, but precipitation usually remains light. The combination of available vegetation (fuels), local topography, and seasonal weather combine to form another fire peak from lightning ignitions.

2) Fire Season: March 15 through July 15. The fire season is somewhat variable with a later start if weather remains cool into the spring. Vegetation can support fire by May 1 but in some years it may support fire as early as March if cool season grasses cure during an early warm spell following a wet fall. Lightning ignitions generally occur between late April and mid-July. Lightning is often accompanied by heavy rain but on some occasions multiple dry strikes occur. High winds contribute to fire spread but generally blazes are limited to 0.10 acre or less and require minimal suppression actions, if any. In most situations the absence of wind precludes extensive fire spread. By late July, fire activity drops off significantly.

3) Fuel Characteristics in Relation to Fire Behavior: Annual drying of fuels over winter contributes to receptive fuels in spring from human-caused ignitions. The previous summer and fall grass crop is standing and available along with cured annuals.

4) Fire regime alteration: Some compositional change has occurred in the Floodplain/Upland Riparian and Scrub Desert vegetation types due to the proliferation of non-native annual grasses. The presence of these non-native species may have altered the natural fuel regime by occupying the inter-shrub spaces thus creating a more continuous fuel bed resulting in larger fires. These invasive species and the altered fire regime are most common in the Rio Grande floodplain, chronically disturbed areas such as those found along roadsides and grazing lands frequented wild burros and trespass livestock.

5) Control problems and dominant topographic features: Control problems could range from low to extreme depending on the site and burning conditions. Spring winds are normally very strong, which greatly increases fire spread. The largest fires to date have been associated with thunderstorms. The mountain terrain influences local wind patterns, accessibility, vegetation density and fire spread. Natural barriers are present and will be used when available.

Along the river corridor, the dense riparian vegetation contributes to spotting. Big Bend's remoteness and the required lengthy response time for resources outside the park is a major factor in fire control. Wildland/Urban Interface needs to be considered in three of the five developed areas.

6) Other Elements of Fire Environment: The Wildfire Protection Agreement with Mexico allows firefighting resources from either country crossing the international boundary to suppress threatening Wildland fires. The paucity of available firefighting resources in the area must be considered along with risks and values during elevated fire danger situations. The park is designated a Class I air shed. The unknown location of many cultural sites requires minimal ground disturbance.

2. Fire Management Unit #2: FMU 2, designated as the Wildland Fire Use Unit, contains approximately 574,900 acres of the remote backcountry including 533,900 acres of proposed wilderness.

The preferred strategy for managing fire in FMU #2 is to allow the natural ecological processes to occur so as to perpetuate and maintain un-manipulated ecosystems to the maximum extent possible. Naturally ignited fires may burn under predetermined prescriptions and conditions as listed in Table IV-10. The cause of each fire must be determined in order to make proper management decisions. The prescription for Wildland Fire Use precludes permitting this type of fire for resource benefit to enter FMU #1. Any Wildland Fire Use spread that threatens values to be protected in FMU #1 will be checked with an appropriate management response.

a. Physical and Biotic Characteristics of FMU #2: FMU #2 is that portion of park lands that does not include developments, utility corridors, fire-susceptible cultural resource sites, legally protected species and habitat, private in-holdings and a variable-width suppression buffer along park boundaries. A virtual boundary exists between FMU #1 and FMU #2 due to the locations of values to be protected (i.e. remote historic properties). An assessment of the values at risk will determine if the ignition will be managed within FMU #2.

Vegetation Categories of FMU #2:

1. *I. Floodplain/Upland Riparian (occurs in FMU #1 and #2):* This vegetation description and the management considerations is the same as described in FMU #1.
2. *Scrub Desert (occurs in FMU #1; #2 and #3):* This vegetation description and the management considerations is the same as described in FMU #1.
3. *High Desert Grasslands (occurs in FMU #1; #2 and #3):* This vegetation description and the management considerations is the same as described in FMU #1.
4. *Shrub Woodland (occurs in FMU #1; #2 and #3):* This vegetation description and the management considerations is the same as described in FMU #1.
5. *Grassy Woodland (occurs in FMU #1; #2 and #3):* This vegetation description and the management considerations is the same as described in FMU #3.

b. Fire Management Objectives specific to FMU #2:
The following are objectives to protect people and property:

- Prevent injuries to the public, staff, and fire personnel.
- Reduce fuels that poses a threat to life and property using prescribed fire and mechanical fuel reduction methods.
- Prevent human-caused wildland fires through public education.
- Maintain safe egress (by hazard fuel reduction, fuel breaks, etc.) from all areas of the park in case of fire.
- Incorporate appropriate fire management tasks (such as providing additional firefighters) into all park divisions.

Natural resource management objectives:

- Properly plan each activity with resource managers
- Determine the natural range of variability of fire-return intervals.
- Determine desired conditions and condition classes for vegetation categories.
- Use fire as a restoration tool or as a maintenance tool.
- Monitor results of fire program activities and adjust management based on new knowledge.
- Where possible, ultimately allow fire to resume its natural role in park ecosystems.
- Carefully apply burning prescriptions.
- Suppress fires that fail to meet management objectives.
- Use minimum impact suppression tactics (MIST).
- Confer with resource advisors.
- Take advantage of surveying opportunities during and after fire operations
- Restore and/or maintain cultural landscapes.
- Use prescribed fire to reduce fuels around sensitive sites.
- Fire Management activities are conducted in accordance with applicable terms and conditions established in the Biological Opinion issued by the U.S. Fish and Wildlife Service.

c. Management Considerations: Specific management considerations are outlined for each vegetation type in the vegetation type description. A qualified Fire Use Manager will be required for each Wildland fire use incident. Such Wildland fire use must be confined within the FMU #2. All Wildland Fire Use fires are

to be monitored daily, or more frequently, using the Wildland Fire Implementation Plan (WFIP). The Fire Use Manager must collect and maintain current information on size, location, behavior, smoke dispersal, safety conditions, and fire effects as described in RM-18, Chapter 11.

d. Historic role of fire: This information for FMU #2 is the same as found in FMU #1

e. Wildland Fire Management Situation:

1. Historical Weather Analysis: This information for FMU #2 is the same as found in FMU #1

2. Fire Season: This information for FMU #2 is the same as found in FMU #1

3. Fuel Characteristics in relation to fire behavior: The fuels lack continuity. Calibration to fire behavior outputs is required to accurately predict observed fire behavior. This is particularly true using Fuel Models 1, 2, 6 and 8.

4. Fire Regime alteration: This information for FMU #2 is the same as found in FMU #1

5. Control Problems and dominant topographic features: Control problems could range from low to extreme depending on site specifics and burning conditions. Spring winds are normally very strong, which greatly increases any fire spread. The largest fires to date have been associated with thunderstorms. The mountain terrain influences local wind patterns, accessibility, vegetation density and fire spread rates up steep slopes. Natural barriers are present and will be used when available.

Along the river corridor, the dense riparian vegetation contributes to spotting. Big Bend's remoteness and the required lengthy response time for outside of park resources is a factor in fire control.

6. Other elements: This information for FMU #2 is the same as found in FMU #1.

3. Fire Management Unit #3: The Chisos Mountains, designated as a Special Treatment Unit contains approximately 39,000 acres. Wildland Use Fires may be allowed within prescription depending on site, or suppressed until research results indicate likely outcomes. These proposed research fires are aimed at supporting science-based management in the park. Fire effects will be monitored with respect to sensitive species and habitats, at differing intensities, and in different seasons. This information builds on work begun in the late 1970s and early 1980s and will allow more informed management decisions on the reintroduction of wildland fire into sensitive habitats and landscapes, help facilitate the restoration of native grasslands, possibly maintain and enhance habitat of listed species, and contribute to the control of invasive exotics in concert with other measures.

a. Physical and Biotic Characteristics of FMU #3: The boundary is within the Vernon Bailey to Pulliam Ridge Rim, east of Route 14, South of Route 13 and Route 12, west of Glen Springs Road, and north of Juniper Canyon Road. Then the FMU boundary goes up to the NE Rim, the South Rim and along the rim of Ward Mountain, then across to Vernon Bailey. This FMU contains the bulk of the Grassy Woodland and Forest Vegetation Types.

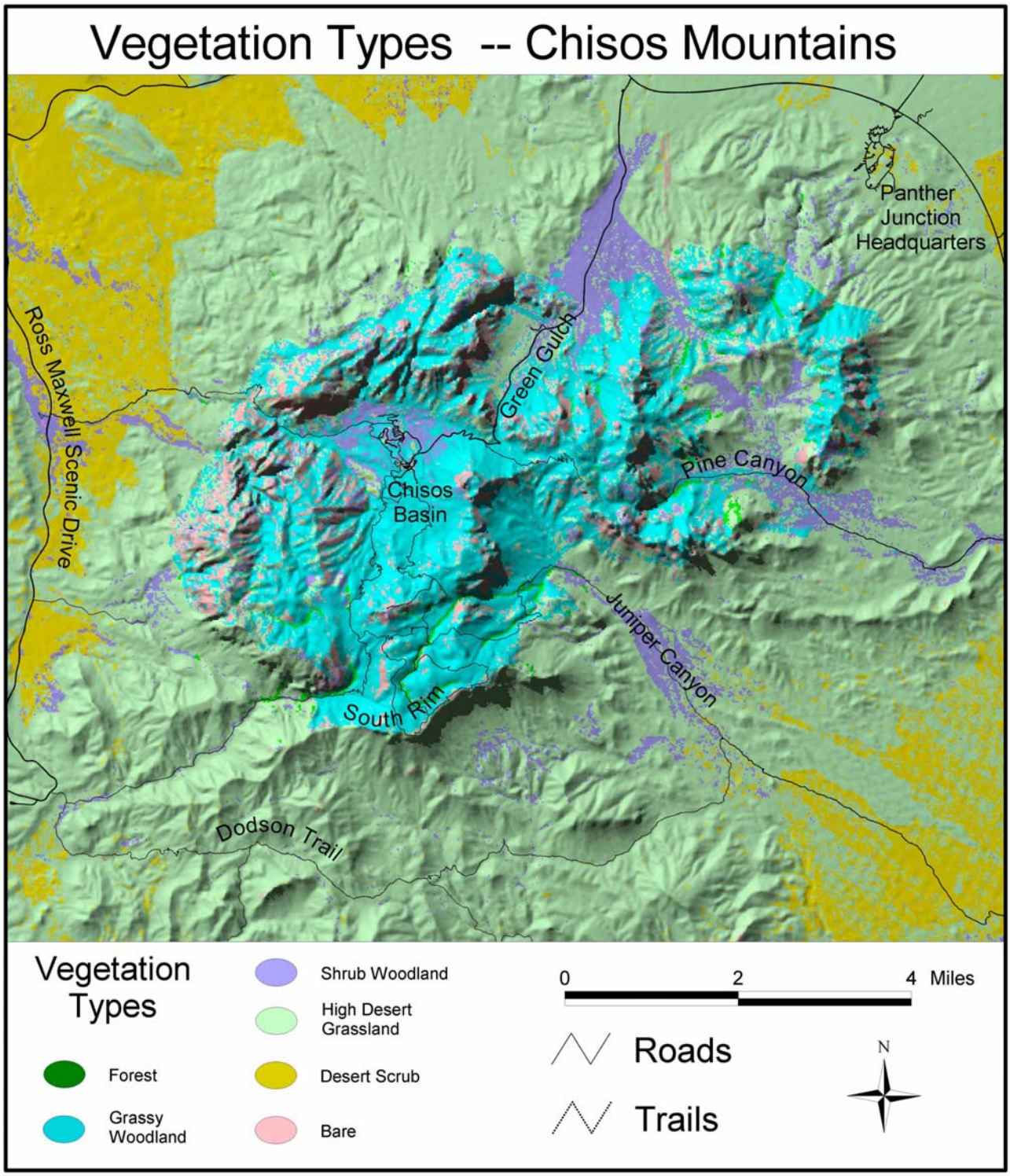

Figure III-5 Vegetation Types – Chisos Mountains

Vegetation Categories of FMU #3:

1. *Scrub Desert (occurs in FMU #1; #2 and #3):* This vegetation description and the management considerations is the same as described in FMU #1.
2. *High Desert Grasslands (occurs in FMU #1; #2 and #3):* This vegetation description and the management considerations is the same as described in FMU #1.

3. *Shrub Woodland (occurs in FMU #1 & #2 and FMU #3) :* This vegetation description and the management considerations is the same as described in FMU #1.

4. *Grassy Woodlands (FMU #3):* Grassy Woodlands contain three cover-mapping categories from Plumb (1993). These are Piñon-Juniper-Grass, Piñon-Oak-Juniper, and Forest-Meadow. These categories are found approximately 5,500 ft to 7,200 ft with more than 16 inches annual rainfall.

    a. Common species: Mexican piñon, redberry juniper, weeping juniper, alligator juniper, gray oak, Graves and Emory oaks. Understory of *Salvia* spp., Harvard agave, silk-tassel, bull muhly, piñon rice-grass.

    b. Grassy Woodlands has the following characteristics:

        - *Present structure:* This category shows canopy closure revealed in an examination of black and white aerial photography between 1962 and 1991 by park staff. Fire-scar data suggest more frequent fire (11 year interval during the 150 year study period) in the past prior to the grazing and suppression era (Moir 1982). General observation of the landscape shows frequent fire-scarred alligator junipers and charred woody debris on the ground. More severe fires would have consumed trees rather than leaving abundant scarring, suggesting fires were grass carried, relatively fast-moving and of low intensity.

- *Fire Regime Condition Class*: II
- *Condition on recent burns:* Fires larger than 100 acres include the Laguna Meadows (1980, 202 acres) and Casa Grande (1999, 230 acres). All were human caused and facilitated by the recovery of fine fuels at mid to high elevations.
- *Fire Cause and Frequency*: The present abundance of fine fuels would support landscape scale fires but they have not occurred. Lightning strikes may have been extinguished by rainfall or contained by topography, or played a part in a cycle involving climate, species and anthropogenic factors. Moir (1982) conservatively estimated a fire-return interval ranging from 9 to 70 years.
- *Fuel model:* 2 - primary carrier of fire is now grass. Fire spread is from fine cured herbaceous fuels in addition to litter and downed stemwood. Open shrub lands, scrub oak and some juniper-pine assemblages fit this model.
- *Insect/disease:* Caterpillar damage on oaks.
- *Problem invasives:* None at present. Native bee brush has colonized areas disturbed by grazing.

Management considerations: Major goals are to manage this vegetation assemblage for ecological processes by allowing fires to burn within prescriptions at low and moderate intensities; protect sensitive resources where mandates direct; and, conduct research burns to learn more about fire effects and fire dynamics. Staff desires species diversity to be retained and fuels reduced. Monitoring will document fire effects and species diversity, particularly from research burns.

5. Forest (FMU #3): The Forest category contains two cover-mapping categories from Plumb (1993). These are Piñon-Talus and Oak-Ponderosa Pine-Cypress. Forest occurs above 6,000 ft where annual precipitation exceeds 16 inches. It forms a mosaic of conifers and grassy woodlands with various other species. The abundance of dissimilar taxa was one reason for the UNESCO Biosphere Reserve designation in 1976.

Common species: Mexican piñon, Graves oak, redberry, weeping and alligator junipers.

Distinct populations: Arizona cypress and Douglas-fir in Boot Canyon, red oak in the Western Chisos; quaking aspen on NW side of Emory Peak; one lateleaf oak and small numbers of netleaf oaks in the high Chisos; Texas madrone on north slopes and canyons, and Chisos hophornbeam on slopes north of Emory Peak and Crown Mountain, in Boot Canyon, and also near Pinnacles Trail and upper Cattail Canyon.

Less common species: ponderosa pine in Boot Canyon, Pine Canyon and Crown Mountain; bigtooth maple in canyons and north-facing slopes; orchid of all species scattered throughout the Chisos; and Guadalupe fescue on the moist slopes of Boot Canyon.

Forest has the following characteristics:

- Present structure: Fuel loads are high with continuous duff of 6-8 inches in places, 5-10 tons/acre standing dead and downed
- Fire Regime Condition Class: II or III
- Condition on recent burns: Fire is expected to burn in this assemblage but it has not.
- Fuel model: 10 (considerable litter and 3 tons/acre dead and downed; high-severity fire likely burning soil organic matter, soil seed reserves, and canopy; stand conversion possible from forest to oak shrubland).
- Fire Cause and Frequency: Lightning caused in the past. Fire frequency estimates are currently being evaluated by the National Park Service and Yale University. Moir's Fire History Study (1982) samples of fire scars in Boot Canyon recorded a 17 year fire interval during the 150-year period.
- Insect/disease: Standing dead has some insect and disease damage; some death from variable oakleaf caterpillar. Damage may also have resulted from drought stress.
- Problem invasives: No problems at present.

Management considerations: Management challenges abound in this category. A mosaic of relict, sensitive, and charismatic tree species and other rare species

covers the steep, largely roadless Chisos. Any high-severity fire in these fuels would require heavy-handed suppression to save existing rare, threatened, or otherwise special plants. Where possible, fire would burn to natural boundaries such as cliffs or talus slopes, trail or roadway, ideally at low and moderate intensities. Management tactics should use hand tools only in this wilderness area. The challenge is how this is to be done. Research fires to understand fire dynamics will reveal how to safely reduce fuels in forest vegetation. Monitoring efforts will be applied to natural, research, and prescribed fire in this vegetation category to document species diversity and understand fire effects and dynamics in particular species, habitats, and terrain. Vancat (Grand Canyon NP Fire Ecologist, personal communication October 2004) proposes that high-severity fire has not occurred in the North Rim of the Grand Canyon's mixed conifer forests because of heterogeneous topography. This scenario offers a possible explanation for the lack of fire in the Chisos despite abundant lightning strikes and heavy fuels. Research burns will be associated initially with mesic environments which represent late successional stages in forests and most likely to indicate effects of fire in valued habitats.

b. Fire Management Objectives specific to FMU #3:

Protecting people and property objectives:

- Prevent injuries to the public, staff, and fire personnel.
- Reduce fuels that threaten life and property using prescribed fire and mechanical fuel reduction methods.
- Prevent human-caused wildland fires through public education.
- Maintain safe egress (by hazard fuel reduction, fuel breaks, etc.) from all areas of the park in case of fire.
- Incorporate appropriate fire management tasks into all park divisions.

Cultural resources objectives:

- Properly plan each activity with resource managers.
- Conduct pre-action surveys.
- Carefully apply burning prescriptions.
- Suppress fires that fail to meet management objectives.
- Use minimum impact suppression tactics [MIST].
- Confer with resource advisors.
- Take advantage of surveying opportunities during and after fire operations
- Restore and/or maintain cultural landscapes.
- Use prescribed fire to reduce fuels around sensitive sites.

Natural resource management objectives:

- Properly plan each activity with resource managers.
- Determine the natural range of variability of the fire-return intervals.
- Determine desired conditions and condition classes for vegetation categories.
- Use fire as a restoration tool or as a maintenance tool.
- Monitor results of fire program activities and adjust management based on new knowledge.
- Where possible, ultimately allow fire to resume its natural role in park ecosystems.
- Carefully apply burning prescriptions.
- Suppress fires that fail to meet management objectives.
- Use minimum impact suppression tactics (MIST).
- Confer with resource advisors.
- Take advantage of surveying opportunities during and after fire operations
- Use prescribed fire to reduce fuels around sensitive sites.
- Fire Management activities are conducted in accordance with applicable terms and conditions established in the Biological Opinion (Appendix D.) issued by the U.S. Fish and Wildlife Service.

c. Management Considerations:

Specific management considerations are outline for each vegetation type in the vegetation type description. FMU #3, the Special Treatment Unit, allows for the measured introduction of low to moderate intensity wildland fire particularly in the Chisos based on the results from research burns. These results provide

the stepping-stones to understanding how to reintroduce fire safely into a landscape following overgrazing prior to the park establishment and 60 plus years of a fire suppression management policy. This management approach acknowledges that historical vegetation communities, and fire return intervals are not well documented and a more careful, research-based approach to introducing fire is warranted. Resource managers also acknowledge that fuel levels will continue to increase in the Chisos while research results are being understood and that a stand-replacing fire could occur before research results are applied.

d. Historic role of fire: This information for FMU #3 is the same as found in FMU #1

e. Wildland Fire Management Situation

1) Historical Weather Analysis: This information for FMU #3 is the same as found in FMU #1

2) Fire Season: This information for FMU #3 is the same as found in FMU #1

3) Fuel Characteristics: Forest vegetation type fuel loading is heavier than average indicated for Fuel Model. Vegetation surveys have reveals a saturation of seedlings and saplings of pine and juniper in High Chisos.

4) Fire Regime alteration: The fire regime information found in FMU #1 (except Floodplain/Upland Riparian) applies the FMU #3. Also, it is possible that some compositional change has occurred in the Shrub Woodland, Grassy Woodland, and Forest vegetation types due to fire suppression. The latest landscape scale fire was recorded over 100 years ago.

5) Control Problems and dominant topographic features: Control problems could range from low to extreme depending on site and burning conditions. Spring winds are normally very strong, which greatly increases fire spread. The largest fires to date have been associated with inappropriate visitor use (abandoned campfires). A vegetation pattern, in particular the Oak canopy that cures over winter and remains on trees until late spring, presents a special problem. The mountain terrain influences local wind patterns, accessibility, vegetation density

and fire spread rates up steep slopes. Natural barriers are present and will be used when available.

6) Other elements of fire environment: Two endangered species (Mexican long-nose bat and black-capped vireo) habitat are limiting factors to the amount of fire spread. The paucity of available firefighting resources requires consideration of greater Initial Attack risks during elevated fire danger situations. The park is designated a Class I air shed. The unknown location of many cultural sites requires minimal ground disturbance.

IV WILDLAND FIREMANAGEMENT PROGRAM COMPONENTS

A. GENERAL IMPLEMENTATION PROCEDURES

Implementation of Wildland fire management components must be consistent with fire management capabilities and should consider the current and predicted conditions affecting fire behavior. Preplanned decisions based on historical fire behavior indices should be considered to most efficiently aid in Stage 1 decisions requiring appropriate management response.

Fire managers will use these strategies for expediting the decision-making process when determining whether to respond to an initial attack as an emergency or if Wildland fire ignition will be used for resource benefit.

A Wildland Fire Implementation Plan (WFIP) will be initiated for all Wildland fires. The WFIP Stage 1 will be prepared by the Initial Attack Incident Commander (ICT4) or Duty Officer based on information provided by the fire size-up. The Stage 1 is the initial stage of the planning process.

The WFIP Stage 1 includes the Strategic Fire Size-Up, Decision Criteria Checklist, Management Actions and the Periodic Fire Assessment. This process will be completed within 8 hours of confirmed fire detection and Strategic Fire Size-Up. The Appropriate Management Response (AMR) decision criteria will be based upon the criteria for the appropriate Fire Management Unit where the fire is located. The full range of natural and cultural resource considerations identified by Fire Management Unit should be considered while determining the AMR.

In FMU #1, where suppression is the only appropriate response, the requirement for a decision checklist as part of the Stage 1 analysis is considered to be met. Subsequently, the Stage 1 analysis may often be satisfied at the programmatic level in the FMP through determinations made by combinations of values to be protected and/or fire behavior thresholds.

B. WILDLAND FIRE SUPPRESSION

1. Range of Potential Fire Behavior: Fuel models present in Big Bend derived from Anderson (1982)

1 = Fire spread is governed by fine, porous and continuous herbaceous fuels that are almost cured. Typical of grasslands and grass-shrub assemblages and has high rates of spread. Scrub Desert (may require calibration due to sparse fuels)

2 = Fire spread is from fine cured herbaceous fuels in addition to litter and downed stemwood. Open shrub lands, scrub oak and some juniper-pine assemblages fit this model. High Desert Grasslands (HDG), Grassy Woodlands (HDG - may require calibration due to sparse fuels)

3 = Fire is carried through tall grasses where one-third or more are considered cured or dead. Highest intensity of the grass fires, especially under wind. Riparian Giant Reed and Common Reed

6 = Fire carries through the shrub layer at moderate wind speeds (8 mi/hr) but drops to the ground at lower speeds and breaks in the canopy. Shrub Woodlands

8 = Slow-burning ground fires with low flame lengths. The fire-supporting layer is composed of compact leaf litter, needles, leaves and twigs. Riparian Mesquite and Tamarisk Stands;

10 =In addition to leaf litter there are up to 3 tones per acre of downed dead material. Fires can be intense burning at ground and canopy level and be difficult to control. This model is characteristic of the Forest vegetation category. (may require calibration due to heavy fuels loads)

Potential fire behavior in Big Bend National Park can range from a creeping surface fire, with flame lengths of less than half a foot and spread rates of 0.1 chains/hour, to a sustained crown fire, with flame lengths in excess of 30 feet and spread rates of 360 chains/hour, depending on fuel type. Fire behavior is directly influenced by season, weather, fuel characteristics, and topography; fires burning during the monsoon rains tend to burn slower and with less intensity than fires burning before the monsoon season or in the late fall. Seasonal curing, as related to fuel moisture and fuel arrangement, plays critical roles in determining potential fire behavior in all vegetation types.

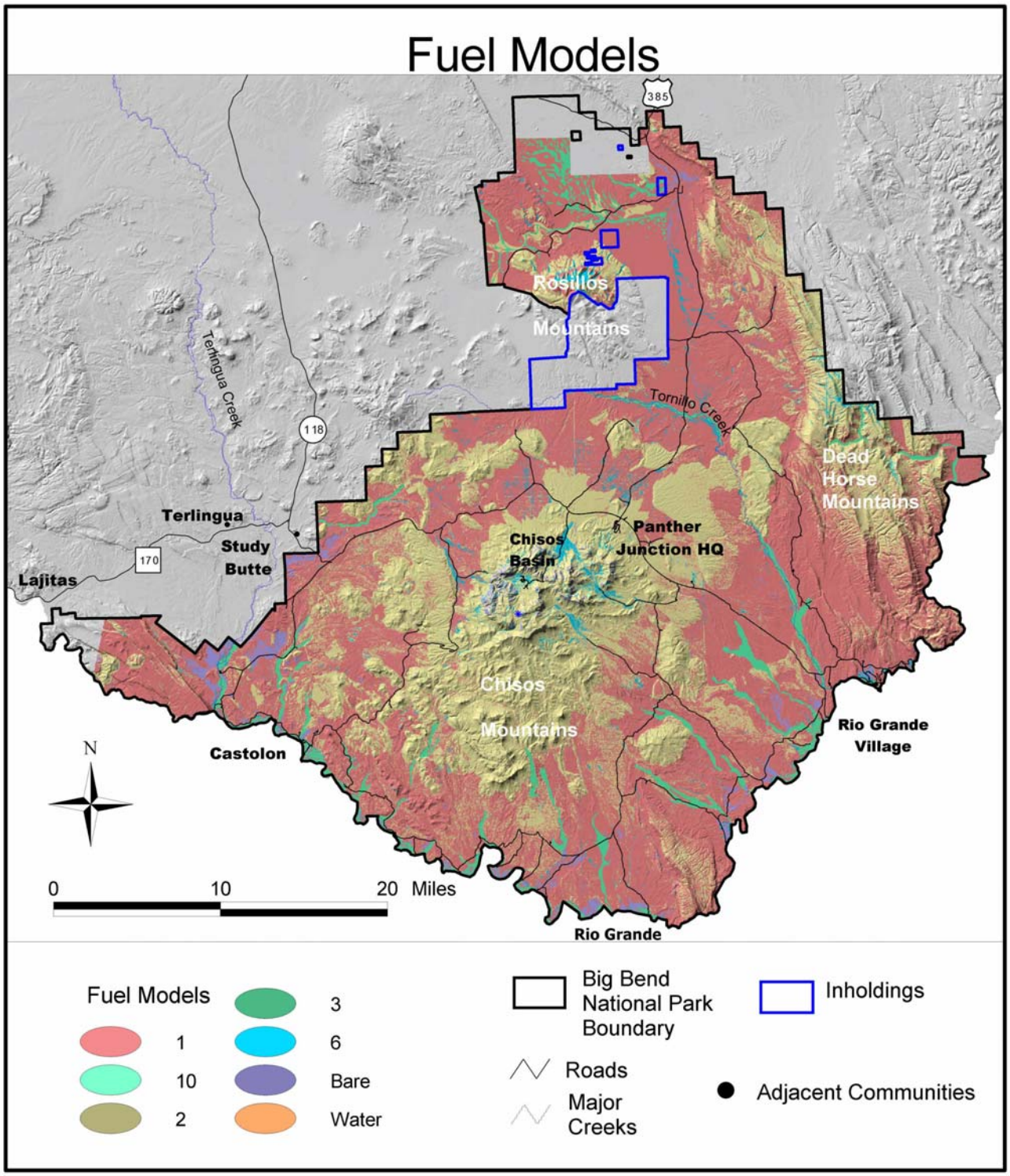

Figure IV–1 Fuel Models

2. Preparedness Actions

a. Fire Prevention Activities: Wildfire prevention is the responsibility of all park divisions, employees, visitors, cooperators,

and concession personnel. Prevention must include public education, safety inspections, enforcement of regulations, hazard fuels management, and related activities. Because wildfires readily cross political boundaries, close cooperation with adjacent state and private landowners is essential. Accomplishment of key prevention tasks outlined in Table IV-1 will substantially reduce the risk or severity of wildfire.

Table IV-1 Fire Prevention Tasks

Task	Responsibility
Plan for Prevention:	
Develop cooperative agreements and memoranda of understanding with private in-holders and adjacent land managers.	Chief, Visitor and Resource Protection
Annually review, revise and implement the cyclic fuel treatment plan.	Fire Management Officer
Annually review prevention analysis following NPS Wildland Fire Prevention Handbook Guidelines	Fire Management Officer
Conduct fire hazard inspections of all facilities prior to fire season.	District Rangers
During periods of high or extreme fire danger, ensure that all ranger patrols are equipped for initial attack; enforce Superintendent's closures and restrictions.	Chief, Visitor and Resource Protection
Increase Public Awareness:	
Include an adequate wildfire prevention message on all backcountry permits and handouts. This should include the rationale for Wildland Fire Use and management ignited prescribed burns.	Chief, Interpretation and Visitor Services
Construct fire danger warning signs and place at Persimmon Gap, Chisos Basin, and the Panther Junction Visitor Center.	Chief, Facility Management

During periods of high or extreme fire danger, issue news releases to local media. Include prevention information and campground and backcountry restrictions; advise day-visitors through visitor center staff and the traffic information radio (TIS). Advise employees and their families.	Chief, Interpretation and Visitor Services

Increase Employee Awareness:

Place fire danger warning sign at entrance to employee housing at Panther Junction.	Chief, Facility Management
Broadcast high or extreme fire danger warnings on park radio.	Park Communications Center
Train employees, their families and residents in prevention and survival.	Fire Management Officer Park Safety Officer
Conduct annual evacuation drill of Chisos Basin Developed area.	District Ranger Concession Manager

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In addition to the above tasks, Big Bend National Park has been divided into ten wildfire prevention zones based upon hazards (fuels), values (developments), and risks (ignition potential). The park's Fire Prevention Plan (Appendix I) contains detailed descriptions of tasks designed to promote fire awareness, reduce human-caused ignitions, reduce structure damage, and improve public and employee safety.

Fire prevention activities at Big Bend National Park has consisted primarily of public contacts in the park and evening programs in the Rio Grande Village, Chisos Basin and Panther Junction areas. Under this plan, the campaign will expand to target private landowners adjacent the Park. Fire-wise, a non-profit organization that promotes fire prevention and preparedness will be the basis for this campaign. The campaign will include an annual open house at the Panther Junction Fire Management Office, a Firewise library, and annual mailings.

Big Bend National Park observes extreme fire danger each spring. A public closure to smoking on trails in the High Chisos and charcoal

fires in campgrounds is enforced from approximately April 1 to the end of fire season. Such restrictions are posted on the bulletin boards at visitor centers as well as the campsite registration bulletin boards at the Chisos Basin Campground. During the fire season, firefighters regularly patrol the established campgrounds and occupied campsites and advise visitors of fire danger conditions. The majority of the contacts are made during the late winter and early spring as visitor use increases prior to and during Spring Break.

b. Fire Training: The National Wildfire Coordinating Group incident qualification and training standards will be followed. Training is a year-round effort to support the interagency qualification and certification standards.

Table IV-2 Annual Training Calendar

Month(s)	Training Activity
January-April	Mandatory 8-hour Wildland fire safety refreshers and work capacity test (pack test) Fire Shelter Deployment practice Cultural resource awareness training
April-October	Local on-going operations training Daily "Six Minutes for Safety" sessions Weekly drills and hose lays Monthly fire shelter deployment practice S/I-100 and 200-level courses based on local needs Class B firefighter exemption driver training Interagency Aviation User Training (B-3)
May	Training Needs Analysis development - courses identified for upcoming training season
September-October	Training Course calendar development Apply for Regional/National training slots TX Wildfire Academy training classes occur
November 1	Course nominations to NARTC training center
November-December	National Training classes occur.

c. Fire Season Readiness: Interagency Fire Readiness Reviews are conducted annually in late March or early April. The reviews include all aspects of fire operations, including facilities, equipment, training, record-keeping, and cache inventories. Performance drills are also conducted and include fire shelter deployments.

After action reviews are conducted after every fire incident following the standards found in the Incident Response Pocket Guide.

Most fire equipment and supplies are stored and maintained at Panther Junction (park headquarters). Outlying developed areas (Chisos Basin, Rio Grande Village and Castolon) maintain small fire caches to support local Initial Attack. The Panther Junction cache inventory is maintained by the designated Cache Managers and has sufficient supplies and equipment to fully re-stock both Type 6 engines at once, and additional personal protective equipment and tools for 100 firefighters. Access to the fire cache is limited and all supplies and equipment are considered accountable to assure that adequate supply levels are maintained. Defective, unsafe or worn-out items should be turned in to one of the Cache Managers for replacement. All individuals who carry fire gear with them are responsible for assuring that it is serviceable and fire-ready at all times, including monthly fire shelter inspections.

Table IV-3 Annual Readiness Activities Calendar.

Month(s)	Readiness Activity
January-February	Order training materials for upcoming local courses
	Submit Mobilization Guide updates
	Annual inspection of helispots (refer to RM 60 & IMR aviation)
February – March	Inventory cache and order replacement supplies/ equipment
	Order crew uniform t-shirts/sweatshirts
	Conduct pre-season risk analysis
	Confirm radio frequencies and programming with cooperators
April	Confirm local vendor availability
	Obtain current EERA's from Lincoln Zone Coordination Center
	National & Regional Mobilization Guides issued
	Annual Big Bend readiness review
April-October	Conduct daily "6 minutes for Safety" sessions
	Conduct weekly readiness drills
	Maintain cache inventory
	Maintain equipment in fire-ready condition
	Replace/rehab supplies/equipment used on incidents
	Conduct after-action reviews for all incidents
November - December	Refurbish all equipment, including radios
	Conduct annual engine maintenance
	Review Fire Management Plan and its appendices, revise as necessary
	Annual Lincoln Zone Operating Plan review and update

d. Fire Weather and Fire Danger:

1) Weather Stations The Panther Junction (417401) and Chisos Basin (417403) stations are remote automatic weather stations (RAWS) located within the Park. Appendix J has Weather Station Catalogs. Both stations are manufactured by FTS and the sensors are maintained by BIBE fire personnel through the RAWS depot at the National Interagency Fire Center (NIFC) in Boise, Idaho. The stations collect, store and transmit hourly weather data. The Panther Junction (417401) station is located on the north side of the Chisos Mountains at 3,785 ft. Thresholds are identified using fuel model L, T and G. The 417403 (Chisos Basin) station is located in the Chisos Mountains at 5,400 ft. Thresholds from this station are identified using fuel models L, F, H and G.

2) NFDRS: The National Fire Danger Rating System (NFDRS) uses daily fire weather observations and forecasts to produce indices that estimate current and forecasted fire danger throughout the United States. The system is designed to produce "worst-case" outputs based on hot, dry, windy conditions.

The best overall indicator of fire danger rating in this area is the burning index. This index takes into account the Spread Component which is used for light fuels that dry quickly and are affected most by the wind, but also incorporates the energy release component which is influenced by heavy fuels and long-term seasonal drying. Since the burning index reflects both short and long-term drying, but also accounts for the daily affect of wind on the fuels, it is a better indicator overall of general fuels conditions in a broad area.

Figure IV-2 plots the 10-day average Burning Index (BI) and the percentile ranking. The fuel type L represents western perennial grasslands (High Desert Grasslands). This fuel model covers approximately 38% of the park, and is the high-risk-potential carrier of wildfire into the higher elevations and heavier fuels. Beginning March 1, the average 10-day BI begins to exceed the 50th percentile (a Staffing Class III, High Fire Danger). The BI remains above the 50th percentile through May 30. May is the first month of the wet season, and June 1 is the average green up day for perennial grasses which drops the fire risk. Heavy visitation begins at Big Bend

about March 1, increasing the risk of human-caused ignitions substantially. Typically, visitation drops dramatically after the Spring Break-Easter period. Lightning becomes the primary ignition source from May through September. May, June and July are generally hot months and pre-monsoon precipitation, conditions suitable for large, lightning-caused fires.

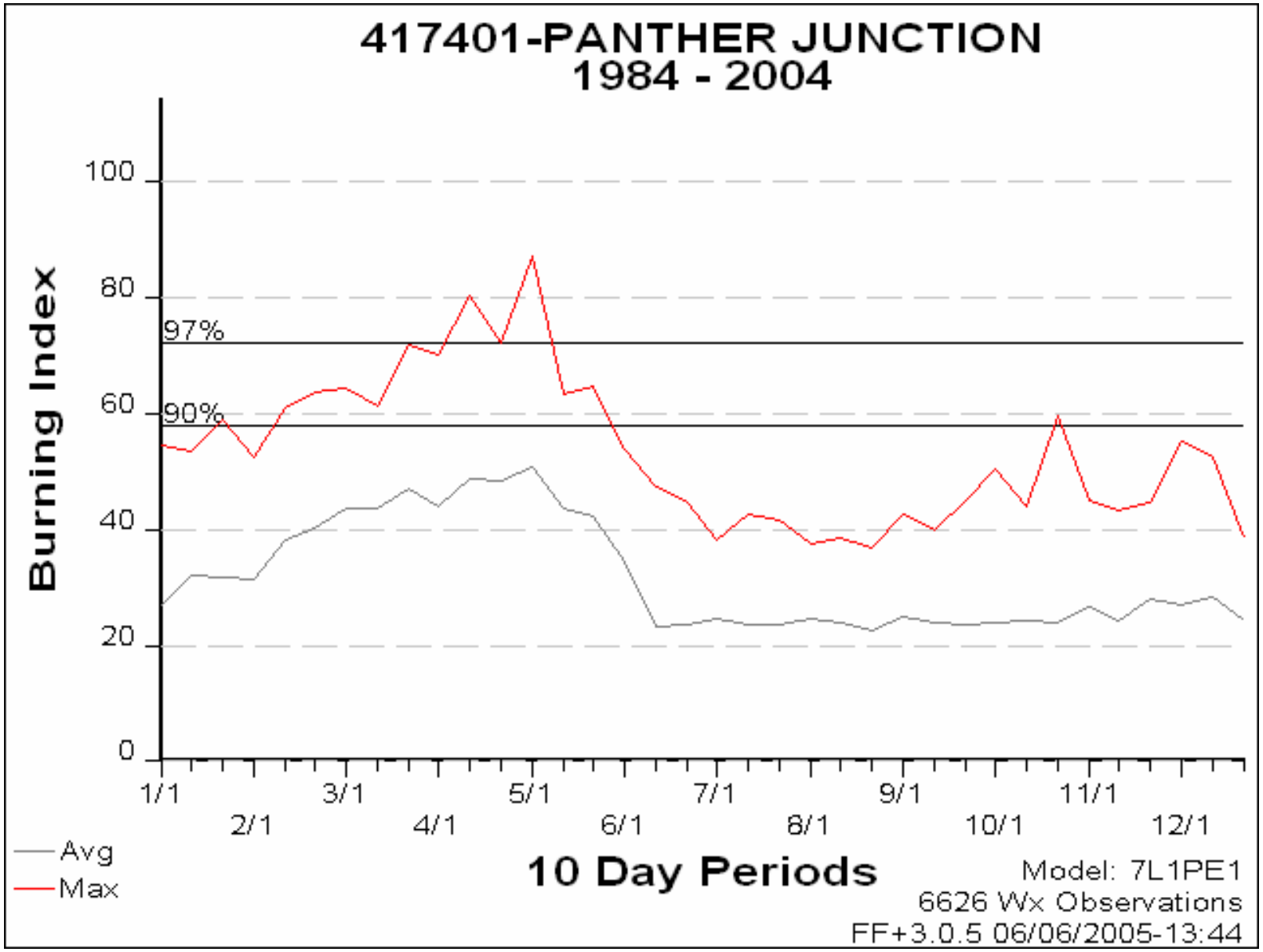

Figure IV–2 Ten-Day Moving Average Burning Index

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The process for developing NFDRS thresholds was through the use of Fire Family Plus (v 3.0.5). Twenty years of weather data (1984-2004) for Panther Junction was analyzed. The process for communicating fire danger information to field personnel is through the use of Pocket Cards, updated annually. The Pocket Cards permit field personnel to calculate the daily BI to the historic average. The fire danger is radio broadcast to all personnel via park dispatch and it is posted with the Daily Report at visitor contact points throughout the park

e. Step-up Staffing Plan:

Table IV-4 Step-up Plan for Big Bend National Park

Burning Index for Fuel Model L
Panther Junction

Staffing Classes	Burning Index	Fire Danger Adjective Rating
I	0 - 29	Low
II	30 - 42	Moderate
III	43 - 53	High
IV	54 - 67	Very High
V	≥68	Extreme

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Management Actions

Staffing Class	Burning Index	Step up Action
SC-I	0 – 13	All seasonal and permanent employees are assigned normal tours of duty at designated stations. Equipment and supplies will be inventoried and serviced. Daily fire weather will be collected at 1300 hours and processed in the WIMS system. Indices and components are computed. Any reported ignitions will be received by the dispatch center. Dispatch will immediately notify the Fire Crew, FMO and the appropriate District Ranger. The ignition point will be located and evaluated, and the proper response taken.
SC-II	4 - 28	Pumps/engines are checked monthly. All equipment is maintained in a ready state at the fire cache at Panther Junction and at District caches. If cloud-to-ground lightning activity occurs, detection flights may be made and a declaration of Staffing Class III determined, if appropriate.
SC-III	29 - 58	Resources and their locations are tracked by Fire Management and Park Dispatch. All fire-qualified personnel will maintain a personal fire pack at a ready state.

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Management Actions

Staffing Class	Burning Index	Step up Action
		The wildland fire engines, structural fire engines and all portable pumps will be checked and operated once a week.
		Red-carded personnel will carry daypacks and initial attack tools in their vehicles.
		During holidays, weekends, or other periods with an expected increase in visitation and increased ignition risk, e.g. spring break, step-up to SC IV is appropriate.
		Step up to SC-IV if there are any active fires in the park.
		Step up to SC-IV if cloud-to-ground lightning activity occurs or if LAL (predicted or actual) is rated at 4, 5 or 6.
SC-IV	59 – 83	Fire Management Officer, will request the Park Superintendent to approve emergency preparedness funds for personal services (premium pay) and detection flights (park aircraft). FMO will notify IMR, Branch of Fire and Aviation Management. Each request, response, and justification will be documented.

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Management Actions

Staffing Class	Burning Index	Step up Action
		Lincoln Zone Interagency Dispatch will be advised of status. TX Forest Service will be advised of status. All on-duty fire qualified individuals will be advised of fire danger rating. Upon advice of the Fire Management Officer, a 6- or 7-day workweek for fire-qualified staff may be initiated and tours of duty may be extended. Scheduled annual leave may be canceled. All on-duty personnel will remain alert to the presence of smoke and/or potential ignition sources. Efforts will be taken to eliminate potential ignition sources; smokes will be reported immediately to Park Dispatch. Fire Crew will be dispatched. When cloud-to-ground lightning activity is reported, a detection flight will be scheduled as soon as safely possible. Visitor center staff will be advised of fire danger rating; park visitors will be informed of fire danger conditions. All backcountry permits issued will have red fire danger warning cards attached to the permits. Backcountry users will be informed verbally at all visitor centers. Advisory notices will be posted at all visitor centers and other prominent locations.

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Management Actions

Staffing Class	Burning Index	Step up Action
		Backcountry coverage will be increased, if feasible. At the discretion of the Fire Management Officer, an IA dispatcher may be assigned until fire danger subsides. Step up to SC-V if there are any actively spreading fires in or threatening the park. Step up to SC-V if cloud-to-ground lightning activity occurs or if LAL is rated at 4, 5, or 6. Additional emergency firefighters may be hired. Notify park neighbors and cooperators of fire danger and request cooperation.
SC-V	84 +	Contact Lincoln Zone Interagency Dispatch Center regarding availability of crews and air resources. Contact Texas Forest Service regarding availability of crews and air resources. The IMR Fire Management Officer will be informed of status changes. Issue closures on all or parts of the park as recommended by the Chief Ranger and approved by the Superintendent.

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Management Actions

Staffing Class	Burning Index	Step up Action
		At the discretion of the Fire Management Officer and with concurrence of the Superintendent, place park personnel on ordered stand-by duty; tours of duty may be extended. A helicopter and module for IA may be requested and employed for stand-by duty. Stage personnel in critical areas to facilitate rapid response to ignitions. Prohibit outdoor cooking in campgrounds and at residences.

NOTE: Levels of preparedness are progressive and include actions established at the lower levels. An emergency Step-up Plan funding account is the funding source for Step-up Plan actions. The Superintendent has the authority to approve this expenditure. Very High and Extreme Staffing Class conditions extending for long-term (i.e. 30 days) is an indication to consider a Severity Funding Request and the staging of additional resources. The regional office has the authority to approve this expenditure.

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3. Pre-attack Plan: Big Bend National Park Pre-attack information is placed within Appendix G of this Wildland Fire Management Plan. The Pre-attack Plan contains lists of facilities, base camps, water sources, helispots, and other data pertinent to Type 3 and more complex Wildland fire incidents. Information such as contact numbers and names must be updated as changes occur.

4. Initial Attack: Suppression includes all actions taken to limit the growth of wildfires and extinguish them. All naturally caused fires not classified as Wildland Fire Use and all human-caused fires, excluding

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management ignited prescribed fires, are wildfires. Wildfires must receive prompt, effective, and efficient suppression treatments selected to minimize resource damage in a cost-effective manner.

An Incident Commander (IC) will be designated for each wildfire. Upon arrival at the fire, the IC will complete an incident size up report (as suggested in Incident Pocket Response Guide or Reference the Redbook for detailed fire size-up checklists) and provide the information to the Big Bend Communication Center. Park Dispatchers are responsible for passing the report information to Wildland Fire Duty Officer, Park Information Officer and Chief Ranger. In the event of fires requiring resources beyond the fire suppression capabilities of the Park, the IC may request additional resources via Lincoln Zone Coordination Center.

a. Initial Attack Priorities

The top priorities for Initial Attack response are:

1. Wildland/Urban Interface
2. Known Cultural Resource Sites
3. Special Treatment Unit
4. Other natural resources at risk

b. Initial Attack Response Criteria:

- Public and firefighter safety.
- Protection of improvements and private property.
- Protection of cultural, historic, and natural resources.
- Minimum fire-line construction and use of Minimum Impact Suppression Tactics (MIST).
- Available suppression resources and response times.
- Fire behavior as determined by fuels, weather, and topography.

Use aircraft and mechanized equipment only where necessary to support above-listed criteria.

The IC is responsible for all actions taken on fires, including operations, plans, logistics, and finance. Qualified staff from all park divisions may be utilized for initial attack and extended operations. It may be necessary to curtail normal operations

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during periods of fire activity. Except for life-threatening emergencies, response to wildfire is of highest priority for action. Response by park staff to wildfire takes precedence over all other normal park activities.

c. Confinement: A confinement strategy may be implemented during attack action to maximize firefighter safety, minimize suppression costs, or maximize availability of critical suppression and management resources to protect values at risk threatened by other fires in the Park. It may not be used to meet resource objectives. Confinement can also be a strategic selection through the Wildland Fire Situation Analysis process when the fire is expected to exceed initial attack capability or planned management capability. A long-term implementation plan is needed to guide the implementation of the confinement strategy. The WFIP prepared in stages, meets this requirement.

d. Fire Response Times: During the designated fire season (March 1 – July 15) and during duty hours (0900-1730) the wildland fire engines at Panther Junction are expected to maintain ten-minute readiness for responses within the Park. Outside of duty hours, a one-hour response is maintained.

Table IV-5 Fire Program Resource and Response Times

Resource Type	Response Time	Time of Year
Overhead	30 minutes	January 1 – March 15
Initial Attack Resource	30-45 minutes	
Reconnaissance Aircraft	1-1.5 hours	
Overhead	30 minutes	March 16 - September 30
Initial Attack Resource	10-20 minutes	
Reconnaissance Aircraft	1-1.5 hours	
Overhead	30 minutes	October 1 – December 31
Initial Attack Resource	30-45 minutes	
Reconnaissance Aircraft	1-1.5 hours	

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e. Restrictions and Special Concerns: The park has identified a general set of restrictions and concerns for the fire management program at Big Bend. For specific incidents, a Delegation of Authority (Appendix M) will be developed that allows the Superintendent to turn over fire management activities to an Incident Management Team. It will include those specific restrictions and critical concerns for the management team that will include key cultural features, key resource concerns, restrictions, approved tools, and will identify agency representatives and advisors. Listed below are the general restrictions and concerns that will apply to any fire management action:

- Provide for firefighter safety.
- Manage incident with appropriate suppression response actions that cause minimal resource damage.
- Manage the fire cost-effectively for the values at risk.
- Provide training opportunities for the park personnel and other cooperators to strengthen organizational capabilities.
- Provide for minimum disruption of visitor access, consistent with public safety.

f. Issues:

1) Wildland Fires in Mexico: Initial Attack of threatening wildfires in Mexico within a 16 kilometers (10 miles deep) "Zone of Mutual Assistance" is possible through the authority provided in the USA/Mexico Wildfire Protection Agreement (2004). The purpose of this Agreement is to enable wildfire protection resources originating in the territory of one country to cross the United States-Mexico border in order to suppress wildfires on the other side of the border within the zone of mutual assistance in appropriate circumstances. Approximately 1 million acres in Mexico is subject to Initial Attack fire protection. The Wildfire Suppression Assistance Act of April 7, 1989, Public Law 101-11 (42 U.S.C. §§ 1856m – 1856o) provides the authority for the United States of America to enter into the Wildfire Protection Agreement with Mexico.

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2) Los Diablos Program: Currently, thirty-nine men (Mexican Nationals) participate in a Wildland Firefighting Program that started in 1990. The remoteness of the park from other USA firefighting resources created the need to find resources nearby. All participants are NWCG qualified. The program has served as an example of co-operation between land management agencies of the two countries.

With assistance from Department of Homeland Security, the Customs and Border Protection Agency, the Diablos are eligible for parole into the United States on an annual basis to assist any emergency firefighting effort in the company of Big Bend National Park staff.

This wildland firefighting assistance from Mexico is in jeopardy with the current border closure at all locations except Port of Entry. Personnel changes in the DHS agency could end the critical support to the Diablo Program. A formal agreement is needed between agencies.

3) Wilderness Considerations: In 1973 a total of 533,900 acres, mostly roadless desert and mountain country were recommended to Congress for wilderness designation, and an additional 27,000 acres were recommended as potential wilderness. The proposal was eliminated from the National Parks Omnibus Bill in the 1978 session of Congress. Even though the proposal was not acted upon by Congress, the recommended area must be managed by the National Park Service in a manner which will not destroy its future suitability for wilderness designation. (NPS Policies 2001)

Management of wilderness is guided by Director's Order #41, Wilderness Preservation and Management (1999). The order directs "Potential disruption of wilderness character and resources and applicable safety concerns will be considered before, and given significantly more weight than, economic efficiency and convenience. If a compromise of wilderness resources or character is

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unavoidable, only those actions that have localized, short term adverse impacts will be acceptable."

Certain fire management activities must be carefully evaluated before implementation within designated wilderness. Generally, these activities include the use of motorized equipment or mechanized transport. Generally prohibited activities will be considered with a minimum requirements analysis. In the event that fire poses an imminent threat to life or property, fire suppression activities can be classified as "Emergency Needs" and, as such, do not require documented analysis prior to approval of a generally prohibited activity or use in wilderness. Authority for approval of emergency use of motorized access or mechanized transport can be re-delegated to the Fire Management Officer who must provide a written report with justification and alternatives considered to the Superintendent. Rationale for authorization will be documented and placed in the incident documentation file. Guidelines for such emergency decisions are as follows:

- A Resource Advisor will be assigned to all extended attack fires, including those occurring in or near wilderness.
- Fire camps and incident command centers will be located outside of wilderness. "Coyote" camps (minimum impact) will be permitted in the proposed wilderness.
- Throughout the Park, motor vehicle use is restricted to existing roads.
- Throughout the Park, hand lines will be located to make full advantage of natural barriers such as rock outcroppings, trails, and dry washes. Hand lines will be no wider than necessary to stop the spread of fire.
- Within wilderness chain saws, helicopters, or pumps will only be used when essential to meet suppression objectives, but with due consideration to impacts on wilderness character and subject to minimum requirements determination.

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- Establishment of permanent helicopter facilities are not allowed in wilderness.
- For fire management purposes, it is generally possible to use unimproved helispots in wilderness and walk into the work site if such an unimproved helispot is available within a 30-minute walking distance. The decision to use a helispot in wilderness will be detailed in a Wilderness Minimum Requirements Analysis as well as an environmental compliance document (i.e., Environmental Assessment or Categorical Exclusion).

Additional details regarding aviation and wilderness can be found in the Aviation Plan.

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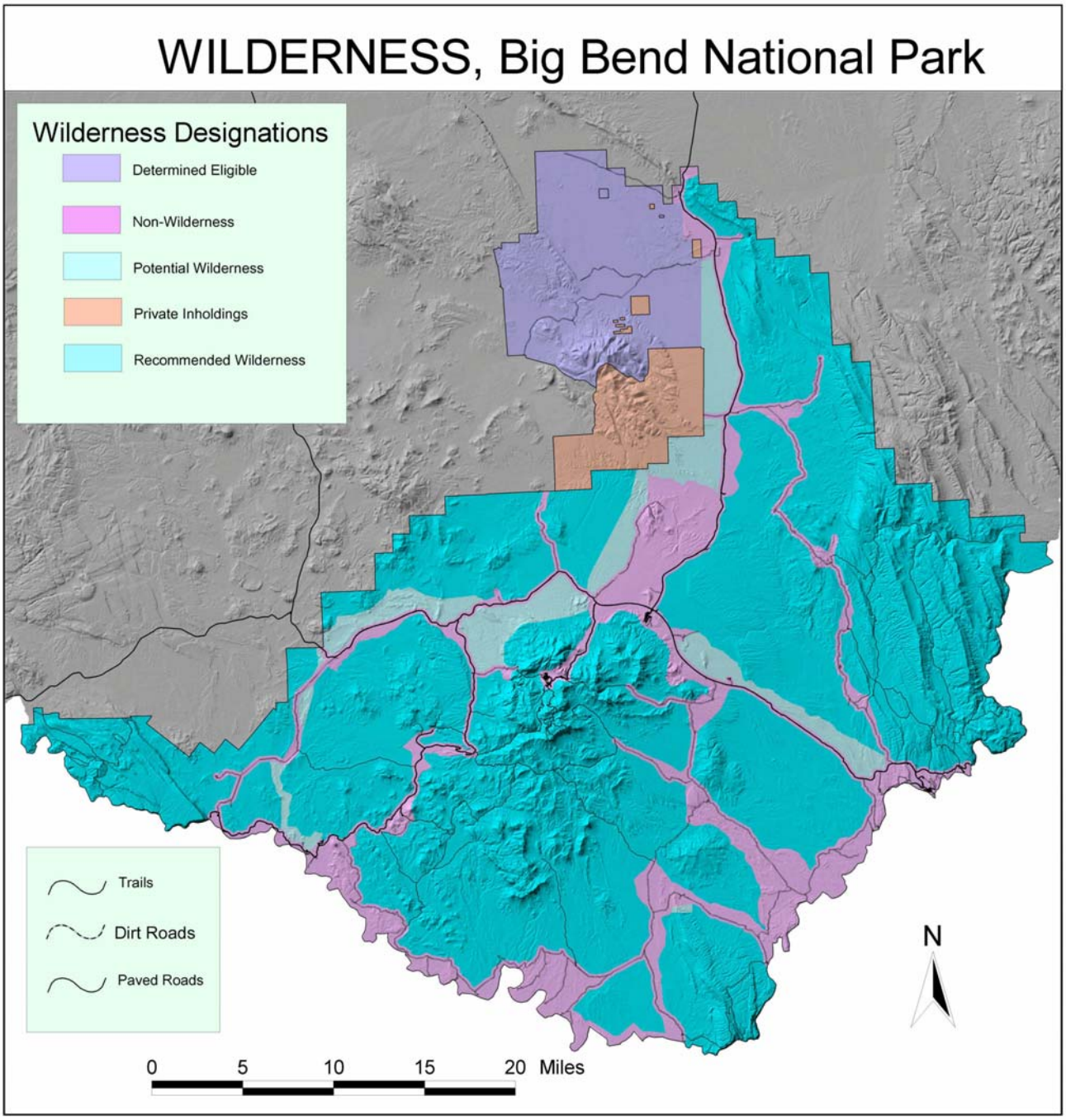

Figure IV–3 Proposed Wilderness Map

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4) Aviation Management: There is a variety of aircraft used in fire operations within Big Bend National Park, and one fixed-wing aircraft is permanently stationed within the Park. This aircraft has Visitor and Resource Protection as a primary duty and the Aviation Management Program is managed separately from the Fire Management Program

It is the policy of Big Bend National Park to use its aircraft for activities involving life or health-threatening emergencies, the administration and/or protection of resources, research, and for individually approved special purpose missions. The objective of every flight is to be the safest, most efficient, economic and effective method of performing the required task, consistent with National Park Service goals. All administrative use of aircraft will comply with the policies and guidelines contained in the Departmental Manual 350-354, Director's Order/Reference Manual #60: Aviation Management (2003); applicable Aviation Management Directorate (AMD) policies and the operational procedures outlined in this plan. *Everyone* is responsible for becoming familiar with and applying correct procedures in all phases of aircraft use. The number one concern at all times is **SAFETY.**

For safety purposes, low altitude flights, helicopter or fixed wing, will be avoided to the extent practicable. Furthermore, low altitude flight directly over wild animals or areas of visitor concentration will be avoided at all times unless such an activity is the express purpose of the flight (e.g., wildlife census flights). An aviation hazards map is available from the Aviation Manager or at the Panther Junction helibase.

There are specific restrictions regarding the use of unimproved landing zones in designated wilderness. These restrictions and additional details of aviation management in Big Bend National Park are found in the Aviation Plan.

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5) Extended Attack and Large Fire Suppression:

a) Extended Attack needs: Extended attack occurs when a fire has not been controlled by the initial attack forces or a complexity analysis is done by onsite resources that recommend a higher level of qualifications are needed for the complexity of the incident. Extended attack action requires a Wildland Fire Situation Analysis to guide the re-evaluation of suppression strategies.

When complexity levels exceed initial attack capabilities, the appropriate Incident Command System (ICS) positions should be added commensurate with the complexity of the incident. The Incident Complexity Analysis and the Wildland Fire Situation Analysis (WFSA) assist the manager in determining the appropriate management structure to provide for safe and efficient fire suppression operations. When additional positions are required for management of wildland fires, the FMO or Acting will coordinate orders with the Incident Commander (IC) and Lincoln Zone Coordination Center or expanded dispatch.

A unified command structure will be a consideration in all multijurisdiction incidents.

The Superintendent will approve the WFSA and any revisions.

b) Implementation Plan Requirements: The WFSA is a decision making process in which the agency administrator or representative describes the situation, compares multiple strategic wildland fire management alternatives, evaluates the expected effects of the alternatives, establishes objectives and constraints for the management of the fire, selects

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the preferred alternative, and documents the decision. The format and level of detail required depends on the specific incident and its complexity. The key is to document the decision made. A WFSA will be completed whenever a fire escapes initial attack. The Agency Administrator, his/her representative, and the FMO or Incident Commander, prepares the WFSA.

An electronic copy of the WFSA can be found at www.fs.fed.us/fire/wfsa/

c) Complexity Decision Process: An Incident Complexity Analysis (Appendix N) will be used as a guide for IC's, fire managers, and Agency Administrators to evaluate emerging fires in order to determine the level of management organization required to meet agency objectives. This will assist in identifying resource, safety, and strategic issues that will require mitigation. There are two types of Incident Complexity Analysis available in Appendix L or M of the Redbook.

d) Delegation of Authority: Should an interagency IC or an overhead team be called for assistance, a Limited Delegation of Authority (Appendix M) will be completed. The Limited Delegation of Authority, signed by the park Superintendent, gives authority to the IC to suppress or manage the fire(s). Constraints identified in the delegation of authority, along with an Agency Administrator's Briefing Package, will provide essential information regarding the fire, legal responsibilities, and the park's resources to an incoming Incident Commander.

6) Exceeding Initial Attack: For the documentation of specific fire environment information (size-up) as well as identification of resources at risk and resulting decisions made to the appropriate suppression response the park has decided to utilize the form found in Appendix K. (This

form is stage 1 of a Wildland Fire Implementation Plan for those units that manage Wildland Fire Use Fires). Big Bend simply has chosen this form to document current fire information.

The WFIP Stage 1 Decision Criteria Checklist will be utilized to determine if an existing appropriate management strategy has been exceeded. With input from park staff, information from the Periodic Fire Assessment and upon completion of the Checklist, the Park Superintendent decides whether to initiate actions to manage the fire with the help of an Incident Management Team. Initial Attack efforts and activities that fail to confine, contain or control the fire beyond two operational periods (48 hours) will result as the fire exceeding initial attack.

7) Minimum Impact Suppression Tactics (MIST): As required by NPS policy, minimum impact suppression techniques MIST guides selection of tools for managing fire. Wilderness areas in particular are to be managed in ways that minimize human impacts on the resource. Fire lines along natural barriers such as the river, roads, trails, cliffs and talus slopes are sought wherever possible, and disturbance to the landscape, cultural and other resources minimized. Suitable sites for staging areas and spike camps have been located in previously disturbed campsites and developed areas. Falling of trees will be minimized. Stumps will be flush cut and covered during Rehab. Agency resource advisors will be consulted prior to implementing management tactics.

8) Emergency Stabilization and Rehabilitation: The Department of Interior Office of Wildland Fire Coordination has issued policy to authorize and provide the means for managing emergency stabilization and rehabilitation following wildland fire on lands or threatening lands under the jurisdiction of the Department of the Interior, or lands adjacent thereto (620 DM 3). The three primary components of this policy are listed below.

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Emergency Stabilization: To determine the need for and to prescribe and implement emergency treatments to minimize threats to life or property or to stabilize and prevent unacceptable degradation to natural and cultural resources resulting from the effects of a fire.

Rehabilitation: (1) to evaluate actual and potential long-term post-fire impacts to critical cultural and natural resources and identify those areas unlikely to recover naturally from severe wildland fire damage. (2) To develop and implement cost-effective plans to emulate historical or pre-fire ecosystem structure, function, diversity, and dynamics consistent with approved land management plans, or if infeasible, to restore or establish a healthy, stable ecosystem in which native species are well represented. (3) To repair or replace minor facilities damaged by wildland fire.

Fire Suppression Activity Damage Repair: (1) To evaluate and plan fire suppression activity damage repair. (2) To fund and implement projects that meet specific Department of Interior criteria found in section 3.10 of 620 DM3 as well as agency administrator criteria.

The Burned Area Emergency Rehabilitation Plan for the park is found in Appendix L.

9) Records and Reporting: Fire reporting follows guidelines established by NPS policy and Directors Order 18 and the associated reference manual, RM-18 (NPS 2005). All fires, regardless of type, are required to have a written report, which is tracked at park and national levels. The following documents are included in this final wildland fire record:

- DI-1202, Individual Fire Report
- Narrative
- WFIP or WFSA
- Daily weather forecasts and spot weather forecasts

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- Cumulative fire map showing acreage increase by day
- Total cost summary
- Monitoring data

The park's FMO is responsible for completion of these reports and consolidation of all materials. As soon as a fire is declared out, the report is finalized and delivered to the fire program office where it is entered into a national database known as the Wildland Fire Management Information system (WFMI). The hard copy of the fire report (1202) are also filed in the fire administrative office, and any 'fire package' is stored in the park.

C. WILDLAND FIRE USE

1. Wildland Fire Use Objectives: The Big Bend National Park's fire management program goals and objectives are aligned with the Park's General Management Plan goals and the guidelines of the National Fire Plan.

Wildland fire use is a step toward restoring natural fire regimes in the park. Fuel buildups that are the legacy of the full suppression era dictate that great caution is still required when considering letting natural ignitions burn. Wildland fire use must be soundly based on management objectives—public and firefighter safety, natural and cultural resources benefits, and interagency collaboration—and may include the full range of fire management strategies on a fire's entire perimeter. The objectives of wildland fire use are listed individually in each WFIP and are specific to each wildland fire use for resource benefit response.

The High Desert Grasslands or Grassy Woodlands play a significant role historically in the vegetation of the Chihuahuan Desert and the desert's relationship with Wildland Fire Use. Lightning ignitions do occur and resulting fires are a natural, disturbance regime. In the past 25 years, (Table IV-6) the park has an annual average of 9.6 lightning ignitions and 765 acres burned.

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Table IV-6 Lightning Ignitions: 1980-2005

Year	No. fires	Acres burned	Year	No. fires	Acres burned	Year	No. fires	Acres burned
1980	5	3.3	1990	16	214.5	1999	11	29.8
1981	2	680.1	1991	6	1492.1	2000	9	7
1982	4	17	1992	8	2687.1	2001	11	10.5
1983	5	0.9	1993	9	3501.8	2002	19	2.2
1984	3	8.1	1994	13	3876.9	2003	3	0.3
1985	6	439.7	1995	17	86.4	2004	4	0.4
1986	1	6.7	1996	11	15.8	2005*	3	0.3
1987	6	111.5	1997	18	2.7			
1988	9	606.1	1998	6	0.6			
1989	37	5325.5						
							242	**19,127**

*Data is through June 2005.

Big Bend WFU activities are associated with several interagency efforts at the federal, state and local area. Wildland fire use implementation in the park has been communicated to our partners and they are supportive.

2. Fire Use Parameters: All parameters (time of year, position of ignition within the FMU, BI index, etc) available to Fire Managers will be used to make informed management decisions (Periodic Fire Assessment) for Wildland Fire Use. Fires from natural ignitions will be allowed to burn within given areas (maximum manageable area or mma) and under specific prescriptions (Table IV-7) where there are minimal values at risk. Natural ignitions in these areas are expected to be infrequent and isolated with fire spread contained by natural barriers.

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Table IV-7 Prescriptions

	Vegetation Types and Fuel Models					
Parameters	Flood Plain (3 & 8)	Scrub Desert (1)	High Desert Grasslands (2)	Shrub Woodland (6)	Grassy Woodlands (2)	Forest (10)
Fire Management Unit (FMU)	1 & 2, RB	1,2 & 3, RB	1, 2 & 3, RB	1, 2 & 3, RB	2 & 3, RB	3, RB
Fine Dead Fuel Moisture (fuel particles <0.25" in size and measured in % of moisture)	Unlimited in non developed areas > 5% in developed areas	Unlimited in non developed areas > 5% in developed areas	> 5%	> 5%	> 5%	> 5%
Mid-Flame Wind Speed (mph)	Unlimited in non developed areas < 8 mph in developed areas	Unlimited in non developed areas < 8 mph in developed areas	0 to 8	0 to 8	0 to 8	0 to 8
Live Fuel Moisture (%)	n/a	n/a	>100	n/a	>100%	>100%
Slope (%)	n/a	n/a	n/a	>25% ONLY in secure locations	>25% ONLY in secure locations	>25% ONLY in secure locations

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Legend for Table IV-8

RB = Research burns can be conducted in all FMUs to meet natural or cultural resource objectives.

Fuel Models (derived from Anderson, 1982)

Fine Dead Fuel Moisture (FDFM): This relates to grasses and other fine texture or small particle fuels. The measurement considers temperature, relative humidity, time of day, aspect, slope, shading (from overstory or clouds), and season (winter, spring, summer, fall). Measurements range from 2 to 20%. The higher percentages indicate wetter fuel.

Mid Flame Wind Speed (MFWS): MFWS is the average velocity of wind measured at eye level. This can be read directly with a handheld anemometer or calculated from weather station wind speed measurements (at 20 ft and average over 5 minutes) with the consideration of the sheltering effect from vegetation or topography.

Live Fuel Moisture (LFM): This measure is related to the stage of vegetative growth and moisture content of live vegetation. LFM may range from a high of 300% for fresh, moist new growth foliage to a low of 30% for completely cured and dry old foliage. The 100% live fuel moisture rating is considered mature foliage with new growth complete, comparable to older perennial foliage. Where LFM is not a crucial factor in predicting fire behavior in certain fuel models, it is listed as N/A.

Slope and Secure locations: This relates to the steepness of the topography. A rating of "n/a" means to allow fire spread on all slopes in these vegetation types. At higher elevations and woody vegetation, prescribed and natural ignitions are allowed on slopes > 25% only if the fire spread is a backing fire (backing down hill, against the slope) or the fire spread will likely stop against fire spread barriers (talus slopes, cliffs, and other secure locations).

A number of pre-determining factors would also be weighed (Figure IV-4 and Table IV-8), including national preparedness levels, air quality restrictions, and current local resource availability. If fire spread can be managed with available resources, if ecological values will be enhanced, if cultural values can be protected, and if air quality effects to the park and the surrounding airshed are minimal or manageable, then fire use projects are acceptable.

Decision Flow Chart for Initial Action on Ignitions

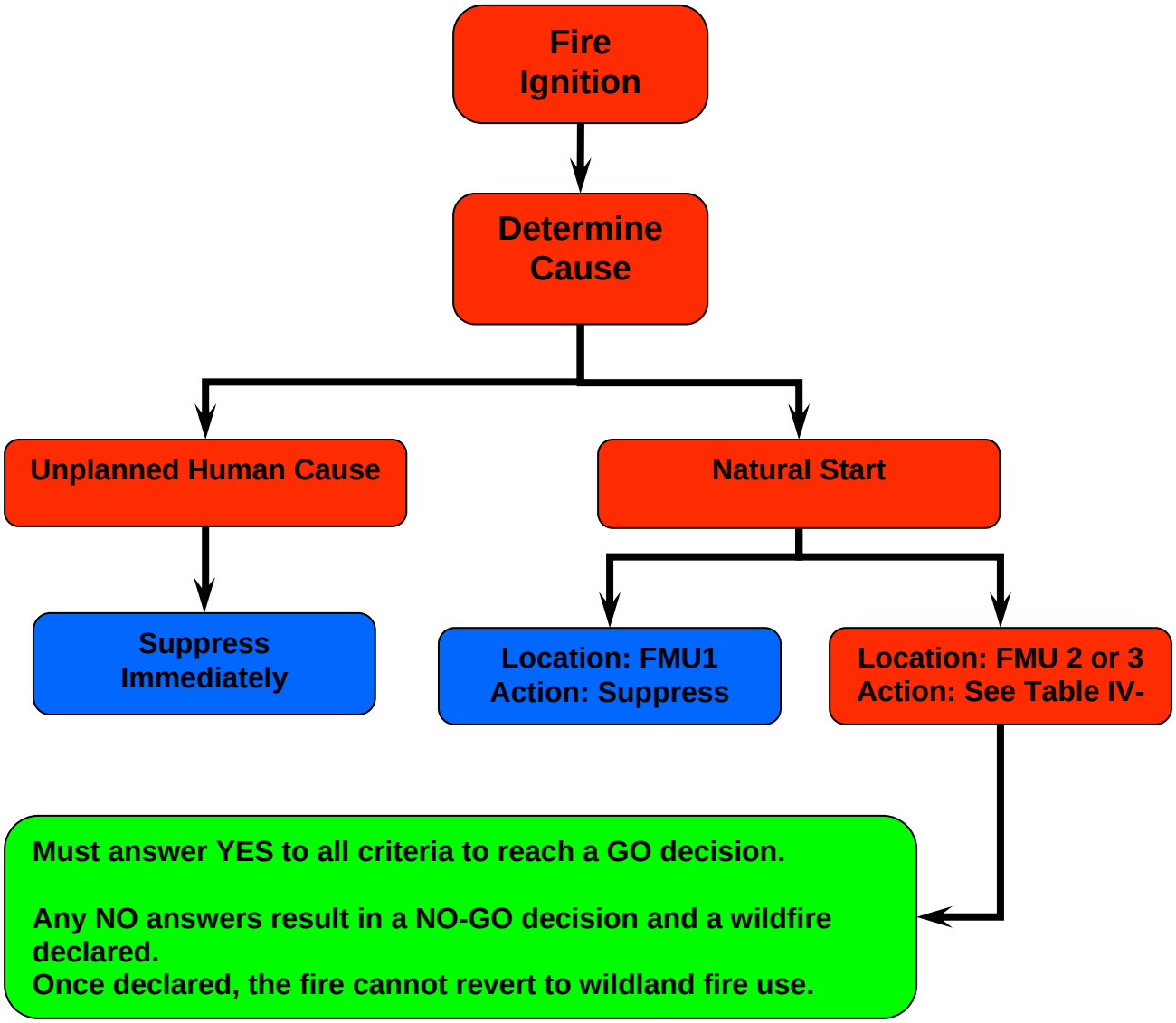

Figure IV–4: Decision Tree for Initial Action on Ignitions

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Table IV-8 Wildland Fire Use Decision Criteria

Decision Criteria	Questions
Ignition	Is it a natural source?
	Is the location within a wildland fire use zone? *Or*, Can the natural ignition meet research requirements under Research Burns? [Fire use decisions depends on meeting location, values-at-risk, season, and desired outcomes criteria]
Management Objectives	Are resource objectives being met? Are potential effects on natural and cultural resources within the acceptable range of effects and variability?
Size	Is the current and expected size known?
	Is the potential risk for escape acceptable?
Fuels	Are live fuels moistures within prescription?
other	Are drought indicators acceptable: i.e. 1000-hr TLFM*, Palmer drought index)
Topography	Is the terrain in locations for potential holding actions along the maximum management area accessible and safe for crews to work in?
Resource Availability	Are local, regional or national resources available? Is there a qualified, dedicated individual to manage the fire as an ICT4 or FUM2, depending on stage of management?
Safety of Life and Property	Can the threats to firefighters, staff, visitors, residents, neighbors, associated property and infrastructure be minimized?
Environmental Constraints	Is smoke dispersal and direction acceptable?
Political Constraints	Is managing this fire for wildland fire use compliant with current policy, moratoriums, political constraints, funding and efficiency issues?
Summary	If YES to all above – manage within prescriptions

TLFM* = Time-lag fuel moisture. 1000-hour TLFM is a measure of moisture content of the largest diameter fuels.

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In all cases, wildland fire use incidents will be monitored by fire personnel. The fire management strategy will transition from fire use to suppression when a) periodic assessment recommends this, b) the fire threatens to exceed the maximum manageable area, c) or the fire poses a threat to other values.

Such wildland fire use must be confined within the FMU #2 or #3. All Wildland Fire Use fires are to be monitored daily, or more frequently, using the Wildland Fire Implementation Plan (WFIP). The Fire Use Manager must collect and maintain current information on size, location, behavior, smoke dispersal, safety conditions, and fire effects as described in RM-18, Chapter 11.

The Park Superintendent has the authority to decide whether a Wildland Fire Use ignition will be permitted to continue to burn. The Superintendent's decision must be based upon prescription parameters and conditions discussed in RM-18, Chapter 9, and on the recommendations of the Fire Use Manager.

The frequency (daily or less frequent) for completing the Periodic Fire Assessment is established based on the current and expected fire and weather situation. When Big Bend sets a monitoring and assessment frequency, the Fire Managers will develop a “step-up” frequency based on levels of fire activity, external attention and influences, or other critical concerns. Then, as situational concerns escalate, the monitoring and assessment frequency can correspondingly increase. Conversely, as situational demands lessen, monitoring and assessment can “step down” and become less frequent.

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Standards and Rationale for Establishing Assessment Frequency
"step-up" assessment frequency actions.

Fire Size > 300 acres	**Fire Size < 300 acres**
Observed Rates of Spread exceed 20 chains per hour	Fire Size doubles

"step-down" assessment frequency actions.

Fire Size > 300 acres	**Fire Size < 300 acres**
Observed Rates of Spread < 20 chains per hour	Same

The valid dates in the WFIP reflect the length of time that the identified assessment frequency will be used. If the assessment frequency is changed, the valid dates must be changed accordingly.

Big Bend has weather monitoring capability and is part of a regional network. The Chisos Basin RAWS is located just southwest of the Chisos Basin Ranger Station in the approximate center of the Park, at 5,400-ft elevation. This station reflects weather conditions affecting the higher elevation level of the Shrub Woodlands vegetation type and the low elevation level of the Grassy Woodland vegetation type. The Panther Junction RAWS is located southwest of the Panther Junction Visitor Center at 3759 ft. elevation. This station reflects weather conditions affecting the higher elevation level of the High Desert Grasslands vegetation type and the low elevation level of the Shrub Woodlands vegetation type. The Chisos Basin fire weather station was established in December, 1978 and this station transition into a RAWS in 1993. The Panther Junction fire weather station was established in September, 1978 and transition into a RAWS in 1993. Although data has been collected since 1978, reliable data begins with 1984.

Big Bend National Park participates in an interagency fire weather program that includes the latest technical tools for obtaining and analyzing fire weather data. This program is outlined in a detailed document named the "Southwest Area Fire Weather Annual Operating Plan, 2004" and it is updated periodically. The Park also participates in a second interagency fire

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weather program "Fire Danger and Preparedness" sponsored by the Texas Forest Service. The Big Bend Fire Management program will continue to utilize whatever tools and expertise are made available through the interagency fire weather program.

3. Pre-planned Implementation Procedures: Fire Family+ software seasonal assessment tools will be used to develop weather analysis and pocket cards for reference in wildland fire use implementation.

Pre-Planned Actions:
When a fire is reported, the parks will take the following actions:

- **Locate the fire**
- **Size-up and determine cause**
- **Complete a WFIP Stage I analysis** to determine the *appropriate management response* within two hours of fire confirmation.
- **Report incident to Texas CEQ, El Paso Air Quality District**
- **Choose the *appropriate management response*** based on the previous Stage I analysis (Agency Administrator). In this example, the decision is made to manage the fire for resource benefit because the agency administrator found the potential for complexity, climatology, projected fire behavior, natural and cultural resource effects, and relative risk indicators to be acceptable.
- **Implement the *appropriate management response*** – For fire use projects this may vary from periodic aerial reconnaissance to on-scene fire monitors. If the management complexity of the fire exceeds the capabilities of local resources, the parks will manage the incident through delegation to a Fire Use Manager or Fire Use Incident Management Team (for a delegation of authority example, see Appendix M).
- **Continue to reassess the fire situation** – During a fire use project the park must perform periodic fire assessments. The superintendent must continually validate that the fire is managed appropriately and will assess if there is a need for a more detailed stage II or III WFIP analysis, or conversion to a wildland fire suppression action. The frequency of the periodic fire assessment will be indicated on the signature page of the Periodic First Assessment form attached to the WFIP. Signature frequency can range from daily (high complexity, high risk fires) to weekly (low complexity, low risk fires). If the periodic assessment indicates that the fire can no longer be successfully managed for resource benefit, a Wildland Fire Situation Analysis (WFSA) will be prepared to analyze and document changes in fire

management strategy. The WFSA format is available online at http://www.fs.fed.us/fire/wfsa/

- **Manage the fire until declared out** according to monitoring and frequency guidelines indicated in the WFIP. At the minimum, periodic ground or aerial reconnaissance will be used to verify the periodic re-validation of the fire use response. More in-depth monitoring may be necessary to ensure proper incident management if complexity or risk increases. The parks monitor for wind speed, wind direction, smoke plume rise and dispersal, temperature, humidity, fuel moisture, fire size, and fire behavior (rate of spread, direction of spread, intensity).

4. Non-pre-planned Implementation Procedures:

a. Procedures for Periodic Assessments: The most current version of the Wildland Fire Use Implementation Procedures Reference Guide (May 2005) will be the basis for completion of WFIP. This guide requires qualified personnel to complete the WFIP stages. Until declared out, any fire use fire will be periodically assessed (daily or more frequently) and this assessment documented by the Superintendent on the Periodic Fire Assessment form.

Table IV-9: WFIP Completion Timeframes

WFIP Stage	Maximum Completion Timeframe
I	8 hours after confirmed fire detection and Strategic Fire Size-up
II	48 hours after need indicated by Planning Needs Assessment
III	7 days after need indicated by Planning needs Assessment
Periodic Fire Assessment	As part of all stages and on assigned frequency thereafter

b. Requirements for preparation of WFIP plans: A Wildland Fire Implementation Plan (WFIP) will be initiated for all wildland fires. Included in Appendix K, the full WFIP is a three-

stage document, progressively developed for all Wildland fires managed for resource benefits. The Fire Management Officer or other qualified ICT4 will be responsible for completing the Stage 1: Initial Fire Assessment that provides the decision framework for selecting appropriate management response. Operational management decisions are described in the WFIP. Specific WFIP requirements are outlined in the Wildland and Prescribed Fire Management Policy Implementation Procedures Reference Guide hereafter referred to as the Implementation Guide.

The Stage I: Initial Fire Assessment includes the Fire Situation and the Decision Criteria Checklist for the initial "go/no-go" decision. It documents the current and predicted situation, documents all appropriate administrative information, and aids managers by providing them with decision criteria to make the initial decision whether to manage the fire for resource benefits or to take suppression action. In addition to the checklist shown in the Implementation Guide, other unit-specific management criteria may be added if managers feel they contribute to the decision process (Table IV-7). The Stage 1 must be completed by a qualified ICT4 within 8 hours of fire discovery and initial size-up.

5. Potential Plan Implementation Impacts: Based on historic fire occurrence within the Park, most fires managed for resource benefit will require only a Stage I Plan: Initial Fire Assessment, as they involve only a single tree or yucca in very sparse fuels, isolated by natural barriers, and burning out naturally within 24 hours. Approximately 17% of the lightning caused fires may have some potential beyond 24 hours and would require a Stage II Plan, Short-Term Implementation Actions and regular revalidation. Due to comparatively sparse fuels, and low risk of significant spread over a long time period, it is highly unlikely that fires will require a Stage III Plan, Long-Term Assessment and Implementation Actions.

Impacts in general will not be significant beyond the Fire Management Program, which will experience an increased work load. The rare longer duration Wildland fire use incident will create local jobs (feeding assigned resources, transportation services, etc.) and have moderate impacts to park operations (press release, logistical support, mapping and data gathering, etc.).

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6. Staff Positions for Implementation: A qualified Fire Use Manager (FUMA) will be required for each Wildland fire use incident. If one is not readily available then one will be resource ordered immediately. It is not possible to manage WFU without a FUMA after Stage 1 is completed. When an ignition occurs the following positions will make up the implementation management team that will be responsible for initiating steps in the decision process necessary to support the appropriate management response, whether it be wildland fire use or suppression.

Superintendent:

- Responsible for making the Go/No Go Decision based on information provided by the FMO/Fire Use Manager
- Ensures requisite compliance and consultation has been done for fire management activities
- Signs the Wildland Fire Implementation Plan (WFIP) and periodic assessment to validate the WFIP decision
- Declares park restrictions and/or closures as needed
- Issues a written delegation of authority in the event a Fire Use Management Team is assigned and assigns an agency representative
- Insures that fire information is managed as described in Big Bend's FMP, Chapter IX

The following training is recommended for this position:

- Fire Management for Agency Administrators
- National Park and Wilderness Fire Management
- Participate in one post-season wildland fire use review or evaluation

Chief Ranger:

- Evaluates fire activity in terms of public and employee safety and makes recommendations to the superintendent for closures or restrictions
- Insures patrols are used to enforce restrictions or closures
- Designs and implements the park evacuation plans at the discretion of the superintendent
- Insures that a comprehensive fire management program at the park is adequately planned for and implemented
- Assists in development of Maximum Manageable Area and management decision points

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It is recommended that this position meet the following qualifications and/or conditions:

- Fire Management for Agency Administrators
- National Park and Wilderness Fire Management
- Familiar with park resources.
- Familiar with wilderness laws, policies, and philosophy.

Fire Management Officer:

- Insures implementation of fire management plan and coordinates wildland fire and prescribed fire programs
- Responsible for insuring that the fire program is managed within RM-18 guidelines
- Responsible for analyzing fire weather and fire season severity to support fire use decisions, preparing WFIP stage I and the Relative Risk Rating Chart on all wildland fires
- Establishes the review timeframes for periodic assessment on all declared wildland fire use projects Completes WFIP Stage II, coordinates with state air quality, local wildland agencies, and orders resources as needed, such as monitors, prescribed fire behavior analyst, or a Fire Use Management Team
- Provides input into Maximum Manageable Area and long-term risk assessment in accordance with Stage III
- Serves as the Fire Use Manager for wildland fire use projects
- Orders resources, supplies and equipment and materials to support wildland fire use projects

This position will meet the following qualifications and conditions:

- NWCG qualifications for ICT3 and Fire Use Manager.
- Knowledge and experience in the fuel types and ecosystems referenced in this plan.
- Knowledge and experience with wilderness resources.
- Attend National Park and Wilderness Fire Management.
- Attend Fire and Ecosystem Management.
- Participate in one post-season wildland fire use review or evaluation.
- Be able to perform this assignment for the duration of the event. Would be unavailable for fire suppression assignments.

Fire Management Program Assistant:

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- Acts as logistics coordinator and comptroller for project
- Track expenditures daily against the fire account, reports expenditures to the FMO and prepare a final
- financial package as an official record of the project that will be reviewed during program audits

Fire Ecologist:

- Monitors and documents fire weather, behavior, and fuel consumption and map location
- Works with the Resource Advisor for coordination of monitoring requirements, methods, and staffing
- Provides feedback to the FMO and or fire use manager in terms of fire use and resource management objectives
- Assists in development of Maximum Manageable Area and management decision points

This position will meet the following qualifications and/or conditions:

- Familiar with park resources.
- Familiar with wilderness laws, policies, and philosophy.
- Attend National Park and Wilderness Fire Management.
- Attend Fire and Ecosystem Management.
- Knowledge of and ability to operate GIS/GPS systems, FARSITE and RERAP fire prediction programs.

Duty Officer:

- Report resource availability
- Update weather activity
- Situation report to Lincoln Zone Dispatch
- Serves as contact point for Initial Attack
- Logistics Coordination

This position will meet the following qualifications and/or conditions:

- Familiar with park resources
- Incident Commander Type 4
- Be able to perform this assignment for the duration of the event. Would be unavailable for fire suppression assignments.
- Knowledge and experience in the fuel types and ecosystems referenced in this plan.

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- **Resource Management Specialist(s):**
- Provides input during candidate and ongoing wildland fire use projects regarding sensitive species, special resource concerns
- Assists in development of Maximum Manageable Area and management decision points
- Aids in development and implementation of individual monitoring plan for each WFIP Stage in coordination with the Fire Ecologist
- Responsible for compliance and consultation initiation/documentation

This position will meet the following qualifications and/or conditions:
- Familiar with park resources.
- Familiar with wilderness laws, policies, and philosophy.
- Attend National Park and Wilderness Fire Management.
- Attend Fire and Ecosystem Management.

Resource Advisor(s):
- Provides input during candidate and ongoing wildland fire use projects
- Assist in development of Maximum Manageable Area and management decision points
- Aids in development and implementation of individual monitoring plan for each WFIP Stage in coordination with the Fire Ecologist

This position will meet the following qualifications and/or conditions:
- Familiar with park resources.
- Familiar with wilderness laws, policies, and philosophy.
- Resource advisors that work on any active portion of fireline **must** meet physical fitness requirements for an arduous duty fire qualification card (red card).

7. Public Information Provisions: The FMO, Chief Ranger, and Park Information Officer will meet after the initial designation of a wildland fire in order to determine the most appropriate information and interpretive needs. In order to cover the information and interpretive needs, the Chief of Interpretation and Information Officer will insure that the following actions are taken:

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Initial Action:
1. Obtain briefing from FUMA or FMO covering the current situation, size, location, expected duration, resources committed, resource threats, anticipated closures, and plan of action.
2. Inform media of wildland fire activity - size, location, expected duration, resources committed, and any anticipated restrictions or closures.
a) Prepare 'draft' press release, reviewed by FMO and approved by the Superintendent, for immediate release discussing the fire(s), objectives of the operation, size(s), location(s), expected duration, resources committed, and any anticipated restrictions or closures.
3. Assign Field Information Officers as required by the operation, or requested by FUMA or FMO.
4. Assign Interpreters, as required, to provide increased visitor information services in the affected district relating to the prescribed fire operation.
5. Provide briefing to cooperating agencies (TxFS, TPW, Brewster County, Alpine) on fire situation.

Key agency, state, and local contacts for public information include:

- Big Bend National Park, Panther Junction Visitor Center Information Desk (432-477-1158), Fire Management Office (432-477-2397/2369), Fire Information Officer (during ongoing Wildland & prescribed fire incidents)
- Lincoln Zone Dispatch Office, Lincoln National Forest (505-437-0778)
- Brewster County Emergency Management Office (432-837-9876)
- Brewster County Sheriff's Office (432-837-5541)
- Texas Forest Service Regional Coordinator (432-336-7290)
- Texas Commission of Environmental Quality,(Air Quality) El Paso District (915-834-4949)
- National Park Service, Intermountain Region Fire Operations , Denver, CO, Information Officer (303-969-2948)
- Other interest groups as appropriate (hiking clubs, neighborhood groups)

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8. Wildland Fire Use Project Records:

a. Each wildland fire use project will have a permanent record developed which will be maintained in the permanent Fire Management Office files at Park Headquarters. This record will include: 1) the approved Wildland Fire Implementation Plan (Stage I, II, III as applicable) including all amendments and revisions; 2) Wildland Fire Situation Analysis (if required).

b. Monitoring reports and summaries of findings, along with a summary of all monitoring activities including a monitoring schedule (level 1 and 2 monitoring) as prescribed in the Big Bend National Park Wildland and Prescribed Fire Monitoring Plan (Appendix F).

c. All revalidation and certification documents.

d. Funding codes (FIRECODE account information) and all cost accounting documents, including daily and summary spreadsheets.

e. Project Maps. All fires greater than 100 acres will be permanently mapped and archived, using GIS whenever possible. A digital shape of the fire perimeter, gathered from field observations and/or mapping with GPS should be standard procedure.

f. Include other fire incident information as appropriate, such as photo points and monitoring plot locations.

g. Wildland fires are funded through normal accounting procedures using individual project accounts. The Fire Management Program Assistant will establish the fire account and advise the Regional Fire Office so that any resources ordered from outside the park will be charged to the appropriate account. Documentation of all expenditures to the account will be included in the final fire package.

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D. PRESCRIBED FIRE

1. Planning and Documentation: Annual application of management ignited prescribed fire is planned for implementation at Big Bend National Park under this Fire Management Plan. The program parameters includes hazard fuel reduction, vegetation maintenance and/or restoration, restoring ecological processes, fire ecology research, historic scene maintenance and debris disposal. In addition, a training program in wildland fire management is to be carried out by utilizing the various components of the overall management burning program. Specific locations and projects are outlined in the Ten-Year Work Plan (Appendix H).

Department of Interior, National Park Service policy and guidelines will be followed in the planning, implementation and review of all prescribed fires conducted on all lands administered by BIBE. The use of any fire ignited by NPS, or NPS designated personnel is considered a prescribed fire, with the exception of debris burning, and is subject to the requirements outlined in RM-18; Chapter 10. Plans shall be peer reviewed by a qualified cooperator. A Burn Boss will be in charge of prescribed fires, if not an NPS, or BIBE employee, then empowered with a Delegation of Authority signed by the Superintendent.

a. Annual Prescribed Fire Activities: The full range of prescribed burn activities may be conducted every year at BIBE. These activities include collaborating with Science and Resources Management for planning and priority setting. Implementation activities include surveys for cultural resources, burn unit preparation (i.e. manual fuel reduction); writing burn plans and conducting prescribed burns.

b. Long-Term Prescribed Fire Strategy: Under predetermined conditions or prescriptions (defined in Table IV-7), resource and fire managers will intentionally ignites fires to achieve resource objectives. Prescribed fire will be used to reduce fuels around buildings, remove hazard fuels in the vicinity of cultural resource sites, maintain habitats of listed species, maintain historic scenes, restore grasslands, or aid in the control of exotics, and where appropriate restore or maintain natural vegetation or reduce excessively high fuel loadings throughout the park.

This annual burning occurs throughout the year, although peak visitation periods are normally avoided. Various ignition devices would be used to start and maintain prescribed fires. Prescribed Burn Plans will be developed for each project according to RM-18 guidelines. The plans shall specify the predetermined ranges of environmental conditions such that fire behavior shall be expected to meet project objectives. Air quality/smoke management guidelines will be followed pursuant to the burning regulations of the State of Texas.

c. Prescribed Burn Organization: Big Bend personnel conduct prescribed fires in the park with and without assistance from Zone cooperators depending on the complexity of the burn and risks to be managed. A designated Burn Boss shall be on scene and identified by participating personnel. All Park and non-Park fire personnel assigned to prescribed fires will meet the requirements of their position as outlined in the Interagency Qualifications and Certification System. The FMO and Burn Boss will be responsible for qualification documentation of personnel assigned to the burns. The Burn Boss will also be the Incident Commander of an escaped fire until relieved. An adequate number of contingency resources shall need to be identified in the Burn Plan and available for the prescribed burn.

d. Weather and Fire Behavior: FTS automated weather stations are in operation in the Park at Panther Junction and Chisos Basin. Records are kept year-round and indices are available year. RAWS stations within the forecast zone include Fort Davis, Midland, The Bowl, Pinery, Barnhart, and Midland.

Specific weather prescription parameters will be developed as a part of each individual Prescribed Burn Plan. The Prescribed Burn Plan weather parameters will be measured on site, before, during and after a prescribed fire to ensure the fire is within prescription (Level 1 and 2 monitoring).

The National Weather Service will distribute morning fire weather forecasts, afternoon updates, fire weather watches, and red flag warnings as specified in their annual operating plan. All dispatch/coordination centers and unit dispatchers will be responsible for distributing fire weather information to

firefighters and incident management personnel at initial attack bases, staging areas, field locations, and committed to initial attack/extended attack incidents. Weather information is available on the internet at:

http://www.srh.noaa.gov/maf/HTML/fire_weather.html

Regular Forecasts: Weather observations from the park stations will be entered into the WIMS computer system. These observations are currently input by Texas Forest Service. A normal forecast can be retrieved about 1400 CST during off season service. During fire season service, one forecast is released at 0930 CDT and another at 1630 CDT. The Dispatch Office is able to make these forecasts available to all fire management personnel via the established communications system.

Special Forecasts: Requests for spot forecasts may be submitted at any time. The internet spot weather forecast process is to be used and is accessed at:

http://www.srh.noaa.gov/maf/Fire/index.php

e. Critiques of Prescribed Fire Projects: Each prescribed fire will have a Prescribed Burn Plan. After completion of a prescribed fire, participating personnel will review the fire, elements contained in the Prescribed Burn Plan, complete any monitoring and evaluation requirements, then critique the fire. The objective will be to understand and improve prescribed fire techniques, operations, prescriptions and the fire effects.

f. Reporting and Documentation Requirements: A Prescribed Burn Plan is necessary for conducting any prescribed fire and should be kept on file. Smoke management reporting and documentation is required. All reporting will be accomplished according to RM-18 guidelines. NFPORS accomplishment reporting will be completed.

g. Historic Fuel Treatment: Since 1980, historic fuel treatments at BIBE have been primarily restricted to hazard fuel

reduction burns and mechanical treatments surrounding developed areas. Mechanical treatments for exotic plant removal, hazard trees, and hazard shrub vegetation within the vicinity of campgrounds, historic and administrative structures are conducted annually. Since 1998, broadcast burning has extended beyond areas immediately adjacent to developments and has included research and restoration burns, fuel reduction along access routes and utility corridors, and one phase of activities for the removal of exotic species.

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Table IV-10 Prescribed Burn Program 1996-2005.

Name of Burn	Date of Burn	Acres	Vegetation
Boquillas Cyn TH	June-2005	10	exotic
13/14 Junction	May-2005	531	sotol grassland
Tamarisk Piles	Jul-2003	2	exotic
RGV Wetland	Feb-2003	10	riparian
Comanche Draw	Feb-2003	537	desert shrub
Tules	Jun-1999	0.1	riparian
Basin CG	May-1999	9	piñon-juniper
Lone Mtn.	Apr-1999	645	sotol grassland
PJ Block B	Mar-1999	23	sotol grassland
Bone Spring	Oct-1998	0.2	exotic
PJ Block D	Apr-1998	23	sotol grassland
PJ Block A	Apr-1998	40	sotol grassland
CB Block DEG	Sep-1997	70	piñon-juniper
PJ Block EF	Jul-1997	52	sotol grassland
Helispot	May-1997	4	sotol grassland
CB Block B	Jan-1996	10	piñon-juniper
	Total Acres	**1966.3 ac**	

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h. Prescribed Burn Plan Requirements: Every prescribed fire planned and implemented within the boundaries of BIBE will have a Prescribed Burn Plan prepared by a qualified Prescribed Burn Boss, reviewed by the Chief Ranger, by Science and Resource Management Specialists, reviewed by a non-BIBE fire specialist, then approved by the Park Superintendent prior to ignition. The Prescribed Burn Plan will follow the RM-18, Chapter 10 policy and guidelines. The plan peer review process is required in advance of the final approval by the Superintendent, and subsequent prescribed burn.

2. Exceeding Existing Prescribed Burn Plan: If a prescribed fire exceeds the perimeters set forth in the Prescribed Burn Plan, the fire will be considered out of prescription. If the fire can be brought back into prescription that same operational period with existing resources and funding, the prescribed fire can continue until all objectives are met. If the fire cannot be brought back into prescription with existing resources and/or funding, it will be designated as a wildland fire. An Incident Commander will be designated and an appropriate management response will be taken on the newly designated wildland fire. Full control of the escape fire is the appropriate management response. If the fire cannot be controlled and becomes an extended attack wildland fire, a WFSA will be initiated, a suppression strategy will be determined and the WFSA will be approved by the Park Superintendent.

3. Air Quality and Smoke Management: Smoke is a consequence of all fires. Increasing emphasis is being placed on mitigating smoke pollution, specifically fine particulate matter, from both natural and management ignited fires. The impact of smoke pollution from wildfire and management fire is recognized, and visual aspects of air quality are being addressed within the park. The wildland fire program must take into account smoke as a source of pollution, major air circulation patterns and conditions which affect smoke dissipation and procedures for mitigating smoke pollution from wildland and management ignited fires.

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a. A deteriorated air quality situation currently exists in the park with visibility the highest resource management concern of the visiting public.

b. Program of Action: Park staff will monitor the air quality conditions prior to igniting any prescribe fires in the park. Air quality is a sensitive resource issue and should take into consideration not only the visitor's but also our neighboring community and employee's health and safety. Every effort will be taken to assure that fire operations, specifically management ignited fires will not add to the degradation of air quality on days when the visibility is already impaired.

Smoke dispersal along park roads is a major safety issue and should be also considered a priority when igniting management fires

Strategies which minimize prescribed fire smoke problems are avoidance, dilution, and reduction of emissions (Prescribed Fire and Fire Effects Working Team 1985). The primary tenet of the avoidance strategy is to burn when prevailing winds will not carry smoke into sensitive areas such as population centers, visitor areas, and roadways. In the vicinity of Big Bend National Park, there are few population concentrations which are likely to be seriously affected by smoke from prescribed burning; but, neighboring communities, areas of high visitation, park residences, and roadways must be considered. Burning should take place when smoke plume trajectories are not predicted to reach these areas or when proper precautions, such as placing flagmen on smoke-covered roadways, can be taken.

Smoke concentrations can be diluted by burning under good dispersion conditions, by burning at slower rates, or by reducing the size of parcels burned at one time. Reduced emissions are achieved through effective firing techniques which include the use of backing fires to increase flaming phase combustion and reduce glowing phase combustion. Proper timing, such as burning when fuels are suitably dry, is also important.

Other considerations help minimize smoke production. A burning program should have clear resource management objectives, such as fuel-load reduction or habitat maintenance.

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For example, if management goals are to reduce fine fuel levels, burning should occur when the relative humidity, and thus fine fuel moisture, is low, but when larger fuels are moist. This prevents combustion of larger fuels and significantly reduces the production of particulate matter. In addition, prescribed burning should be the most reasonable method to meet management objectives. Unnecessary burning poses safety risks and contributes to unnecessary smoke pollution. Managers should obtain and use weather forecasts and fire weather information from regional National Weather Service offices in Midland, Texas. Such information assists in prediction of fire behavior and smoke dispersion. Finally, mop-up should begin as soon as possible to reduce smoke production from glowing phase combustion.

I Class I Air Shed: The entire park is within a Class 1 air shed under the Clean Air Act.

II Pre-identified smoke sensitive areas: All developed areas are considered sensitive areas.

III Local and regional smoke management restrictions and procedures:

Pollution from management ignited prescribed fires is regulated to protect the environment. Particulate matter emissions are regulated through an ambient air quality standard of the Clean Air Act of 1967, which covers particles from 0 to 50 µm. Allowable outdoor burning (including prescribed burning for range and forest management) is governed by the Texas Commission of Environmental Quality, revised Outdoor Burning Rule, Title 30 Texas Administrative Code (TAC), Sections 111.201 through 111.221

A number of general requirements exist for allowable outdoor burning, but several are particularly applicable to Big Bend National Park:

1. Notify the Texas Forest Service before carrying out any prescribed or controlled burns that are intended for forest management.

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2. Begin or continue burning only when the wind direction and other weather conditions are such that the smoke and other pollutants will not present a hazard to any public road, landing strip, or navigable water (e.g., lake, river, stream, or bay) or have a negative effect on any off-site structure containing "sensitive receptors" (e.g., a residence, business, farm building, or greenhouse).

3. Post someone to flag traffic if at any time the burning causes or may tend to cause smoke to blow onto or across a road or highway.

4. Keep fires downwind of or at least 300 feet away from any neighboring structure that contains sensitive receptors. This requirement may be waived only with the prior written approval of whoever owns or rents the adjacent property *and* either resides or conducts business there.

5. Begin burning no earlier than one hour after sunrise, end it the same day and no later than one hour before sunset, and make sure that a responsible party is present while the burn is active and the fire is progressing. At the end of the burn, extinguish isolated residual fires or smoldering objects if the smoke they produce can be a nuisance or a traffic hazard. Don't start burning unless weather conditions are appropriate for smoke to dissipate (winds of at least 6 miles per hour; no temperature inversions) and for you to be able to control the fire (winds no faster than 23 miles per hour.

Regulatory authorities, and others in the area that may be impacted, must be notified in advance of plans for open field burning. The Fire Management Officer is responsible for ensuring that these requirements are met.

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E. NON-FIRE FUELS TREATMENT APPLICATIONS

1. Mechanical Treatment:

a. Annual Activities: Non-fire fuel treatments (mechanical) are routine in Big Bend National Park. These treatments include hazard fuel reduction immediately adjacent to park owned structures and near campgrounds. Also, roadsides and utility corridors in the forested mountains are proposed for treatments to thin and clear hazardous vegetation. Selective thinning around several historic properties has been identified to increase protection of these properties from the negative impacts of wildfire. These activities include collaborating with Facility Management and Science and Resources Management for planning and priority setting. Specific locations and projects are outlined in the Ten-Year Work Plan (Appendix H).

b. Restrictions: Non-fire fuel treatments are primarily completed by use of hand tools, including chainsaws. In the proposed wilderness area, minimum requirement analysis is completed prior to the chainsaw use. Limited use of mechanized equipment (backhoe and bobcat loader) has been made where (campgrounds) this method is appropriate with park management direction. Tractor mowers are used to reduce grass cover in the campgrounds and along roadsides. Chippers have been utilized to reduce some of the material being removed. The residual chips have been re-used in re-vegetation of other disturbed lands within the park. The majority of fuel treatment residue (limbs, brush, etc) is being removed from the treatment site and transported to park lands undergoing re-vegetation treatment. The cover provided by the fuel treatment is providing opportunity for grassland restoration.

c. Monitoring Requirements: The fuels treatment effects are being monitored and the treatment monitoring objectives are discussed in the Wildland and Prescribed Fire Monitoring Plan (Appendix H). Cost accounting and

project reporting/documentation for all non-fire fuels treatments are required. Invasive and exotic species (Tamarisk, Bufflegrass and Giant Reed) are identified for removal in a separate Exotic Plant Plan (in draft). The removal of exotics plants adds to the park-wide reduction of hazardous fuels that place natural and cultural values (cultural sites, upland springs and streams, endangered species) at risk.

d. Mechanical Treatment Critiques: After completion of a mechanical treatment, participating personnel will review the treatment, elements contained in the Plan, complete any monitoring and evaluation requirements, then critique the treatment. The objective will be to improve mechanical treatment techniques, operations, objectives and the mechanical effects.

e. Cost Accounting: All costs will be accounted for and documented (spreadsheet). This cost documentation will become a part of the project record and utilized for cost estimating of future projects.

f. Reporting and Documentation A Mechanical Treatment Plan is necessary for conducting any mechanical treatment and should be kept on file. Accomplishment of treatment objectives reporting and documentation is required. All reporting will be accomplished according to RM-18 guidelines

g. Annual planned project list: This list is contained within the Ten-Year Treatment Plan (Appendix H-1).

F. EMERGENCY REHABILITATION AND RESTORATION

The Department of Interior Office of Wildland Fire Coordination has issued policy to authorize and provide the means for managing emergency stabilization and rehabilitation following wildland fire on lands or threatening lands under the jurisdiction of the Department of the Interior, or lands adjacent thereto (620 DM 3). The three primary components of this policy are listed below.

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Emergency Stabilization: To determine the need for and to prescribe and implement emergency treatments to minimize threats to life or property or to stabilize and prevent unacceptable degradation to natural and cultural resources resulting from the effects of a fire.

Rehabilitation: (1) to evaluate actual and potential long-term post-fire impacts to critical cultural and natural resources and identify those areas unlikely to recover naturally from severe wildland fire damage. (2) To develop and implement cost-effective plans to emulate historical or pre-fire ecosystem structure, function, diversity, and dynamics consistent with approved land management plans, or if infeasible, to restore or establish a healthy, stable ecosystem in which native species are well represented. (3) To repair or replace minor facilities damaged by wildland fire.

Fire Suppression Activity Damage Repair: (1) To evaluate and plan fire suppression activity damage repair. (2) To fund and implement projects that meet specific Department of Interior criteria found in section 3.10 of 620 DM3 as well as agency administrator criteria. (3) To complete fire suppression impact rehabilitation with suppression resources as timely as possible.

The Burned Area Emergency Rehabilitation Plan for the park is found in Appendix L.

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V ORGANIZATION AND BUDGETARY PARAMETERS

A. FIRE MANAGEMENT ORGANIZATIONAL STRUCTURE

The following positions have direct responsibility for the implementation of the fire management program at Big Bend National Park. The park will maintain at a minimum a Type 3 incident fire organization.

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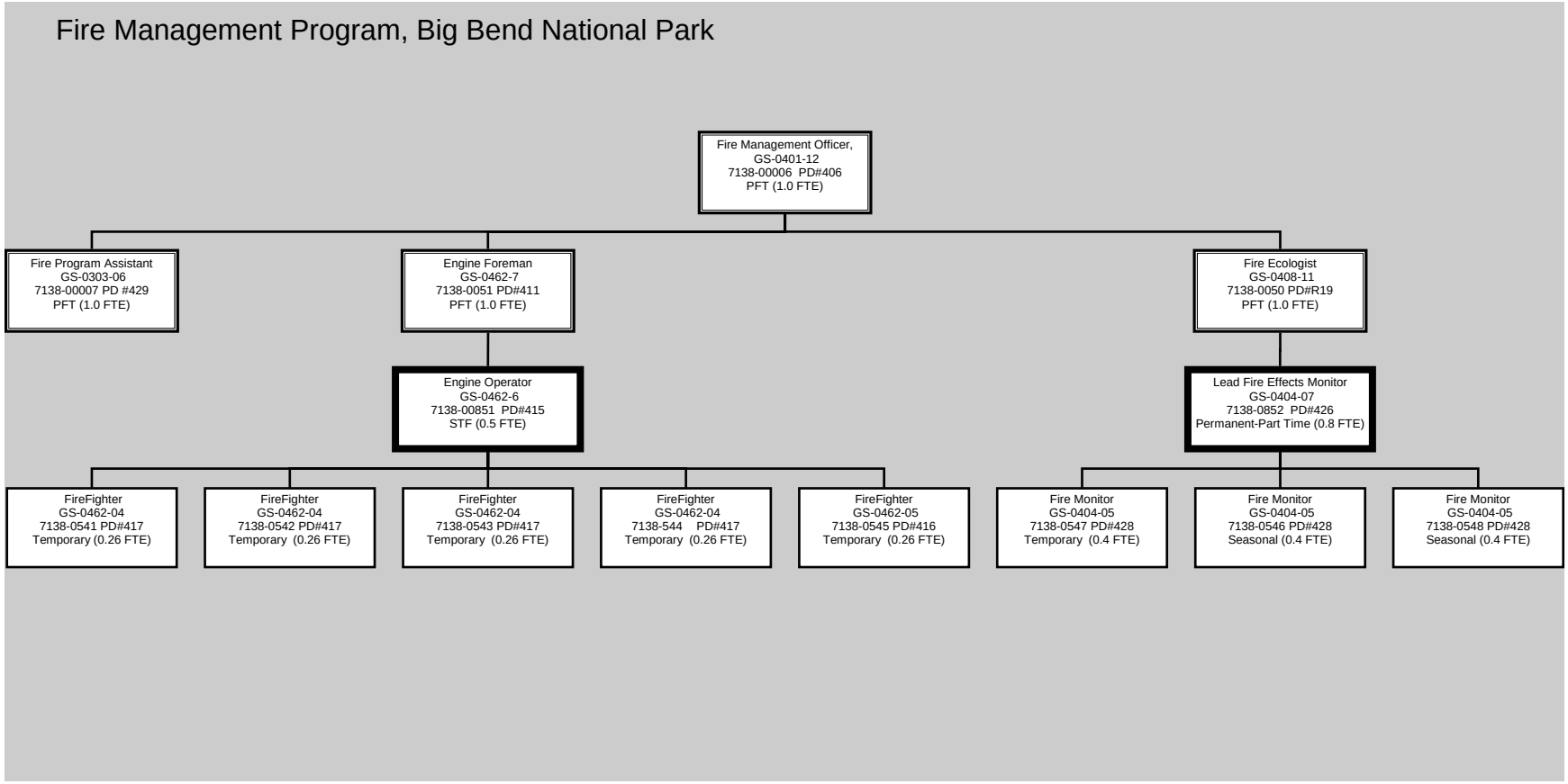

Figure V–1 Organization chart for Fire Management Program, Big Bend National Park as of 2005. PFT = permanent full time, STF = subject to furlough

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Responsibilities:

1. Fire Management Officer: The Fire Management Officer reports directly to the Chief Ranger of Big Bend National Park. Minimum fire line qualifications for the Fire Management Officer are found in *Interagency Fire Program Management Qualifications Standards and Guide August 2001.*

The Fire Management Officer is responsible for all wildland fire operations, including the following:

- Directly supervises and coordinates the prevention, preparedness, management/ suppression of fire programs within the Park.
- Develops and updates park fire management plans, including annual appendix updates.
- Monitors fire danger and recommends fire restrictions in concert with neighboring agencies
- Prepares the fire program budget and coordinates/manages all fire funding and accounts.
- Serves as the lead Interagency Wildfire Contact for the Park, maintaining frequent communication with other units of the Southwest Texas Fire Planning Unit as well as state partners.
- Coordinates Park activities with regional fire staff.
- Directly supervises program lead fire staff.
- Approves DI-1202s for all support actions and fires inside the park. Ensures reports are entered into national database..
- Initiates taskbooks for wildland fire positions, certifies completion.

2. Fire Management Program Assistant: The Fire Management Program Assistant supports the Fire Management Program. This position is responsible for:

- Tracking and updating employee training, incident experience, certifications, qualifications and issuance of "red cards."
- Entering data into various fire-related databases.
- Payroll for fire employees.
- Tracking expenditures charged to fire accounts.
- Processing of travel and personnel documents.
- Documents and keeps records of training classes, out-unit assignments and on-site fire management activities.
- Updates list of employee fire qualifications and availability with LNZ fire dispatch or ROSS.
- Maintains and updates fire program budget in park programs.

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- Assist with all support duties, maintains files, completes fire correspondence.

3. Engine Module Supervisor: Supervises a seven-person engine module. Serves as the Incident Commander for initial attack, evaluates on-site conditions, makes tactical decisions, and provides input to appropriate response in compliance with the guidelines of this Fire Management Plan. Minimum fire line qualifications for the Engine Module Supervisor is found in *Interagency Fire Program Management Qualifications Standards and Guide August 2001.*

- Oversees procurement and maintenance of equipment, apparatus, and supply compliment for the Fire Management Program
- Manages fire weather data collection, weather instruments, and station maintenance.
- Ensures personnel and equipment readiness and capability for safe initial response.
- Leads crew on hazardous fuel projects.
- Ensures personnel and equipment readiness and capability for safe initial response.
- Implements signing and fire prevention activities.
- Leads park fire crews in daily readiness activities, including fire safety briefings.
- Leads park wide refresher training, 100 and 200 level training, and engine readiness.
- Serves as acting FMO according to skills and abilities.
- Serves as Duty Officer during fire season.

4. Fire Ecologist, Chihuahuan Desert Parks: Supervises the Fire Effects Module and in coordination with the FMO, is responsible for the periodic review and revision of the Park's Fire Management Plan.

- Assess monitoring reports in relation to project and resource goals and objectives.
- Proposes and secures funding for fire ecology research.
- Develops rehabilitation plans required following suppression actions.
- Serves as the Park's Resource Advisor to the Incident Commander or Incident Team.
- Leads development of monitoring types, including presence/density of non-native plants.
- Facilitates development of multi-year burn plans, to include second or third treatments.

5. Fire Effects Module Supervisor: The Fire Effects Monitor will implement monitoring in accordance with the FMH manual. The lead monitor will schedule and prosecute the work load in the reading of the

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plant plots. The lead monitor will provide training, both fire and field techniques. In addition the incumbent will support the planning and implementation of fuels treatments.

- Writes and updates fire monitoring appendix to park fire management plan.
- Ensures fire effects monitoring plots are established according to protocols.
- Analyzes data collected from plots, stores data and reports findings to parks on an annual basis.
- Makes assessments of effectiveness of fire in accomplishing vegetation objectives.
- Reviews prescribed fire and fuel project plans for objectives and monitoring plans.
- Serves as acting FMO according to skills and abilities.
- Leads live fuel moisture monitoring program and provides information to interested parties.
- Provides input into ten year treatment plan and monitoring type descriptions.
- Serves as Duty Officer during fire season.

6. Dispatch Supervisor

- Provide communications with the field. .
- Receive and document smoke reports. Inform FMO or Duty Officer as soon as possible.
- Receive/document fire situation updates and orders. Refers orders for action/approval.
- Place spot weather forecasts with National Weather Service. Broadcast forecasts.
- Receive and process resource orders from Interagency Dispatch.

7. Chief, Division of Visitor and Resource Protection: The Chief Ranger directly supervises the Fire Management Officer. Directs and coordinates support activities between the FMO and District Rangers.

- Contribute to protection-based fire management program objectives.
- Monitor effectiveness of wildland fire management plan implementation.
- Assist wildland fire program with needs for fire investigation and enforcement.
- Ensure effectiveness of park dispatch operation in meeting fire operation needs.
- Participate on Wildland Fire Analysis Team as needed. Provide input to WFIP and WFSA.
- Review and implement fire restrictions, trail and area closures, and evacuations.
- Review fire management plan updates and prescribed fire burn plans.
- Ensure coordination and training of field rangers in fire readiness and initial response. Ensure division personnel participate in fire operations.

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(i) 8. Chief, Division of Resource Management and Research

- Contribute to resource-based fire management program objectives.
- Support development of multi-year treatment plans and individual project plans.
- Manage and coordinate NEPA/106 compliance, and accomplish compliance as needed.
- Ensure division personnel participate in fire operations to understand fire use and effects.
- Support development of fire effects monitoring types appropriate to park vegetation.
- Support integrated GIS-based risk analysis models such as FARSITE.
- Participate on Wildland Fire Analysis Team as needed. Provide input to WFIP and WFSA.
- Make resource advisors and specialists available to incident/project teams as needed.
- Through park botanist, compile fire effects information for non-native plants and review proposed treatment areas for infestations, and need to re-seed with local native grasses.
- Responsible for compliance and consultation initiation/documentation.

9. Superintendent:

- Ensures safe implementation of wildland fire management program at Big Bend.
- Ensures program supports Service-wide initiatives.
- Approves wildland fire management plan and updates, interagency agreements and operating plans, delegations of authority, prescribed fire plans, and management of wildland fire use incidents, through daily updates of WFIP or WFSA.
- Ensure wildland fire management program is appropriately planned, integrated with other programs, and adequately supported by other park operations.
- Approve wildland fire management updates, interagency agreements and operating plans, delegations of authority, and prescribed fire plans in absence of Superintendent.
- Participate on Wildland Fire Analysis Team as needed. Provide input to WFIP and WFSA.
- Ensure an agency representative is assigned to Type 1 and 2 incident commanders.

10. Regional Director, Intermountain Region: Authority for the approval of the environmental compliance document for this Fire Management Plan rests with the Regional Director of the Intermountain Region.

11. Duty Officer, Big Bend National Park: The Duty Officer for Fire Management at Big Bend National Park serves on a daily basis during fire season. The purpose of the temporary responsibility is continuing Fire Management Program activities, determining appropriate management response upon notice of new wildland fire reports, maintaining

communications between park dispatch, Lincoln Zone and Fire Management Program employees. A brief description of what needs to be done follows.

Big Bend National Park Dispatch: The Duty Officers needs to contact park dispatch on a daily basis, both during fire season and off season. Preferably in the morning and update the following information:

> **Resource Availability:** What resources do you have on hand for the day, location, and estimated response time.
>
> **Update on weather:** Inform park dispatch if thunderstorms are building, lightning occurring in the area, strong winds, extremely dry air, etc.
>
> **Fire Activity:** If there are fires occurring in the area or if we are responding to a fire call.
>
> **Rx planning:** Inform dispatch if we are going to conduct any burning/black-lining plus the location. Identify Burn Boss to dispatch.
> Ensure burning notifications will be made.
>
> **I.A response:** Let dispatch know who and how many resources are responding to an incident, where they are headed, and if a detection flight is needed. Identify the IC to dispatch.
>
> **Extended Staffing:** You need to determine if extended staffing is necessary. Some reasons for extending include fire activity in the county/zone, unusual weather, the potential for dry lightening, or high winds. Inform park dispatch of any schedule changes.

Lincoln Zone Dispatch: As a duty officer most of your contact will be for resource availability, a resource order contact, or initial attack on Big Bend National Park.

> **Resource Availability:** You need to know what resources you have daily and what resources are available for out of zone assignments,
>
> **Resource Order Contact:** If the zone has an order, contact the lead of the crew such as an engine module leader or helicopter manager for the order. Provide park dispatch and the Fire Program Assistant with a copy of the resource order. BIBE Park Dispatch may be the only contact with LNZ and the Duty Officer may not be involved, especially with non-fire orders.

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I.A Responsibilities: If a fire call comes in; identify the location. If it is on federal lands, roll the appropriate resources to the scene. If it is in our "cooperator's response area," monitor the radio until requested to respond by county units and contact park dispatch.

IC Qualified: Make sure there are qualified personnel on the engine responding to a fire, a Type 4 Incident Commander is recommended. If an engine with a qualified ICT4 is enroute, another engine can respond with an engine operator and crewmember.

Logistical Coordination It will be your job to coordinate the daily activities from project work, pre staging resources, assigning resources to fires/looking for help if needed from the office staff. Other items include contacting dispatch and keeping Chief Ranger and the appropriate District Ranger advised of daily operations.

Back up Resources: If additional resources are needed to help us on a fire or pre-stage at the stations Panther Junction or Chisos Basin, you need to notify dispatch and tell them your request. Follow-up to make sure you know where your resources are located.

Night Calling: As the Duty officer you will be responsible for taking calls throughout the evening after business hours. Keep park dispatch informed on your location and the best method to reach you. Provide your cell phone and phone numbers to park dispatch.

Contact for I.A: You will be the contact for IA activities. This means if you are first out to a fire response, then this could affect the response to a second incident. In this situation, you need to make a decision to hold at headquarters and coordinate activities or delegate duty officer responsibilities to another appropriate staff member (ICT4 qualified).

REMEMBER DO NOT PREFORM DUAL ROLES OF RESPONSIBILITES. IF YOU START TO GET OVER YOUR HEAD DELEGATE DUTIES TO OTHERS OR CALL FOR HELP.

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B. FUNDING

In FY05, the base (excluding fuel treatments and construction) fire program budget for Big Bend National Park was $448,060; approximately the same funding level for the past several years. Currently, the fire budget is planned and dispersed via the Department Level FirePro program.

A FirePro workload (base) analysis is completed each spring by NPS-NIFC. The FirePro budget proposal is prepared by the FMO, approved by the Park Superintendent and submitted to the Intermountain Region in August. Area parks (AMIS, FODA, PAAL, and RIGR) fire management program needs are considered and included in the budget proposal. Transition to a new interagency Fire Program Analysis (FPA) system will take place over the next three years.

C. FIRE MANAGEMENT PROGRAM AT BIG BEND NATIONAL PARK

The Fire Management Program is a part of the Visitor and Resource Protection Division in the organization of staffing and programs at BIBE. The Fire Management Program staff work very closely with staff from the other 4 Divisions (Administrative Services, Facility Management, Science and Resource Management, and Visitor Services) and the park's Management Team.

D. PERIODIC ASSESSMENT AND CERTIFICATION

The Park Superintendent is responsible to periodically assess and certify by signature that continued management of wildland fire use actions is acceptable. The Park Superintendent under certain conditions may delegate this responsibility to another organizational level.

E. INTERAGENCY COORDINATION FOR FMP IMPLEMENTATION

Big Bend National Park is part of the Southwest Texas Fire Planning Unit. The
Southwest Texas Fire Planning Unit is chartered to work cooperatively to implement Fire Program Analysis to achieve fire management objectives in a cost effective manner on an interagency landscape scale.

Only NPS units comprise the federal lands in the Southwest Texas Fire Planning Unit (FPU). One Fire Management Officer from Big Bend National Park manages or guides the wildland fire programs for 5 NPS units; 4 are within the FPU, and the FMO strives for "seamless management" across agency boundaries.

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This planning unit includes approximately 12.5 million acres. Specific partners are:

- Four National Park Service Areas comprising 857,000 acres.
    - Big Bend National Park 801,163 ac
    - Fort Davis National Historic Site 474 ac
    - Amistad National Recreation Area 58,500 ac
    - Rio Grande Wild & Scenic River (no land ownership)

- Texas Parks and Wildlife Department comprising 526,120 acres.
    - 3 Wildlife Management Areas (145,247 acres)
    - 14 Park Units (380,873 acres)

- The Nature Conservancy (TNC) of Texas manages five preserves containing 61,000 acres.
- Texas Forest Service Fire Coordination Regions (Ft. Stockton and San Angelo). Approximately 10.5 million acres of private lands are protected within the Fire Planning Unit.

Specific responsibilities for the Fire Planning Unit are defined in the charter. The Fire Planning Unit will meet at least twice annually to review the charter, resolve interagency issues, and formulate budget requests. Fire management resources are allocated on an interagency basis within the Fire Planning Unit. Fire management needs within the Fire Planning Unit are evaluated using standardized protocols of the Fire Program Analysis and funding priorities are negotiated within the Fire Planning Unit.

F. INTERAGENCY CONTACTS

- Brewster County Sheriff's Office
- Texas Forest Service
- Texas Parks and Wildlife
- Lincoln Zone Coordination Center
- Pecos Valley Dispatch
- Southwest Area Coordination Center
- Texas Interagency Coordination Center
- Maderas del Carmen Protected Area
- Canon de Santa Elena Protected Area
- The Nature Conservancy of Texas

G. FIRE RELATED AGREEMENTS

The charter for the Southwest Texas Fire Planning Unit for Fire Program Analysis will be completed in October, 2005. Other interagency and mutual aid agreements pre-date the establishment of the Fire Planning

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Unit. These agreements are revised annually or at other self-defined intervals.

There is a five-party cooperative fire protection agreement for the State of Texas between the (1) US Fish and Wildlife Service, Region 2 (2) National Park Service, Intermountain Region, (3) National Forests and Grasslands in Texas; and (4) State of Texas, Texas Forest Service; (5) The Nature Conservancy, Texas Chapter.

Big Bend National Park works within the Lincoln Zone Interagency Fire Operations Plan and has access to a variety of fire management resources including the Federal Interagency Communication Center, (dispatch), water tenders, helicopters, and additional engines.

An Inter-park Agreement between Big Bend National Park and Amistad National Recreation Area, Fort Davis National Historic Site, and Palo Alto Battlefield National Historic Site is in place. This agreement provides the support of full-time Fire Management staff to NPS units without this staff.

The Wildfire Protection Agreement between the Department of the Interior and the Department of Agriculture of the United States of America and the Secretariat of Environment and Natural Resources and the National Forestry Commission of the United Mexican States for the Common Border affects the park. This agreement allows fire resources to cross the international border and cooperate on Wildland fire related programs.

Emergency Equipment Rental Agreements are honored on an interagency basis with the BLM, NPS, USFS, BIA, and State of New Mexico Department of Forestry in the Lincoln Zone. Master lists of these resources are kept at the Lincoln Zone Coordination Center, Alamogordo, NM.

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VI MONITORING AND EVALUATION

A. MONITORING PROGRAM

All NPS units that implement wildland fire use and prescribed fire activities must develop short- and long-term monitoring programs to assess accomplishments and to determine the effects of management activities on cultural and natural resources in the parks. While the fire management program is based on a broad array of scientific research that clearly illustrates the important role of fire in the parks' ecosystems, monitoring is essential to provide information about the effects of management activities.

Information from other monitoring efforts will be used to inform the fire management program where pertinent. For example, results from the parks' Inventory and Monitoring Program may be useful to assess the changes occurring in areas of the park affected by wildland fires and areas where fire has been excluded for long periods.

Routine Monitoring
The majority of routine fire related monitoring is accomplished using information provided through the Southwest Coordination Center website. Fire weather is collected by the fire weather stations (417401 – Panther Junction and 417403 - Chisos) hourly. From these observations the National Fire Danger Rating System (NFDRS) indices are generated, providing fire management with fire weather risk factors used in daily planning. Information on air quality, fuel moisture, drought severity and general weather conditions are available on the Southwest Coordination Center Website. (http://gacc.nifc.gov/swcc/. This site also provides vital links to the National Weather Service – Midland Office, as well as other federal and state partners.

Live fuel moisture samples are collected, during the fire season, by the park's Fire Effects Module. These fuel samples are processed and provide actual fuel moisture information which is used in planning of wildland and prescribed fires.

Compliance Monitoring
Compliance monitoring in the park focuses on the endangered species. Annual censuses are conducted by park staff. This information will be shared with Fire Management in order to determine status of the species for management of wildland and prescribed fire projects in the park.

Cultural Resources Monitoring

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The National Park Service recognizes that the effects of fire and the thresholds for unacceptable damage to some types of cultural resources (e.g., archaeological resources) are not well understood. An ongoing effort to obtain baseline information and develop this understanding would make it possible to refine sound risk management for fire planning. Monitoring the effects of fire in field situations would be an important component of this work. However, until systematic laboratory experiments can be conducted, field-based fire effects monitoring would be limited to empirical observations. For resources such as cultural landscapes, systematic fire effects research and monitoring would focus on indicators or criteria for landscape restoration and maintenance. Outlined below is the minimum level of effort for monitoring the effects of fire on cultural resources at Big Bend National Park. This monitoring would provide feedback on the effectiveness of current resource protection measures, such as site avoidance and pre-burn fuel load reduction. It would be designed to document pre- and post-burn resource conditions that are readily observable, such as preservation of flammable historic fabric, visually identifiable changes in surface artifacts and surface conditions, and changes in landscape conditions in historic districts and cultural landscapes.

As systematic processes for evaluating fire effects evolve, monitoring would be revised to support field evaluation. In the interim, cultural resource specialists (usually archaeologists from the Sul Ross University Center for Big Bend Studies) would identify any necessary pre-burn mitigation for prescribed fires, resource protection measures, and the most appropriate monitoring strategy for planned and unplanned burns. In general, these would consist of the following:

Pre-burn
Known cultural resources will be relocated and current conditions assessed using standard operating procedures. This will include documentation of current fuel loads, likely duration and intensity of a fire, threats to features and artifacts, and potential for subsurface impacts through burning roots and stumps. These data will be assessed to determine: (1) which protection measures should be implemented (if any); (2) the potential for fire effects studies; and (3) additional monitoring needs.

During Burn
For all fires, a Resource Advisor or Technical Specialist would provide recommendations to park managers. Although this would be primarily for resource protection, it would also provide documentation of fire behavior and immediately observable effects of fire in and adjacent to cultural resources. If suppression or holding actions were to be taken, the Resource Advisor would monitor as needed to advise on site-specific actions.

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Post-burn
An archaeologist will revisit known cultural resources in burn areas to document any changes in condition and assess post-burn protection needs. Fire effects on cultural resources will be documented and subsequently added to the park's database on the effects of fire and fire management activities on cultural resources. Burn prescriptions and techniques used to protect cultural resources will also be refined.

B. MONITORING PROTOCOLS

Monitoring of fires, both wildland and prescribed, involves the systematic collection and recording of data on fuels, topography, weather, air quality, and fire behavior. Monitoring at Big Bend National Park generally follows the protocols outlined in the *National Park Service Fire Monitoring Handbook*. A fire-monitoring plan is a required element in National Park Service fire management plans. The *Big Bend Wildland and Prescribed Fire Monitoring Plan* found in (Appendix F) provides detailed descriptions and additional protocols for wildland and prescribed fires. The fuels and ecology group within the Fire Management Program will complete this monitoring with assistance provided by other park staff as needed.

Short- and long-term vegetation monitoring objectives applicable to a specific burn area would be stated in the prescribed fire plan. At a minimum, monitoring would comply with the protocol identified in the *National Park Service Fire Monitoring Handbook*. Data collected from short-term monitoring would be attached to the fire report along with any narrative completed by the prescribed fire monitors.

Monitoring includes pre, during, and postfire documentation, and includes documentation of fire location, weather characteristics, fire behavior, smoke dispersal, and the effects of fire on vegetation and fuels. Agency guidelines
direct that all prescribed fires be monitored. The goals of the fire monitoring program are to:

- Verify that prescribed fire program objectives and goals are being met through documentation and analysis of fire effects data and using the data to determine if changes in burn prescriptions are needed.
- To perpetuate a working relationship between fire management and resource management in the developing of fire monitoring goals.
- Increase knowledge of fire behavior and effects on the park's ecosystems.

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- Adhere to standardized data collection techniques for the FMH plots.
- Document fire behavior and weather data for all prescribed fires and wildland fires and keep all data organized and accessible.
- Identify areas in which research/monitoring should be initiated.
- Provide historic and administrative data for fires within the park.

Monitoring plots are in place or planned for all six vegetation categories to establish baseline information on species, vegetation structure, cover and height. These plots augment research begun in the late 1970s and early 1980s to develop databases that indicate fire effects over the long-term.

C. WILDLAND AND PRESCRIBED FIRE MONITORING PLAN:

This plan may be found in Appendix F

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VII FIRE RESEARCH

A. CURRENT OR PAST FIRE RESEARCH

Research priorities are identified by the Fire Management Program working in close cooperation with the Division of Science and Resources Management. In addition, Big Bend National Park maintains communication with the NPS Intermountain Region as well as researchers at New Mexico State University, Texas Tech University and Sul Ross State University. The current prescribed fire program is based on research carried out in Big Bend National Park and in areas surrounding West Texas over the past few decades. The fire program encourages and seeks out research opportunities relating to fire that will aid the park in making better informed resource management decisions.

Studies on file include:

Dick-Peddie, W.A. and M.S. Alberico. 1977. Fire ecology study of the Chisos Mountains, phase I. CDRI contribution No. 35. BIBE files.

Dunham, A.E. 1996. Long-term ecological monitoring of the U.S.-Mexico borderlands in the Big Bend national Park, TX. BIBE files.

Meents, J.K and Moir, W.H. 1981. Fire Ecology study of the Chisos Mountains, phase II. CDRI contribution No. 17. BIBE files.

W.H. 1982. Fire ecology of desert grasslands in Big Bend National Park. CRDI contribution No. 120. BIBE files.

Muldavin, E., Wondzell, S., and J.A. Ludwig. 2001. Forty years of vegetation change in desert grasslands of Big Bend National Park. BIBE files.

Wondzell, S.M. and J.A. Ludwig. 1983. Plant succession as influenced by soil-geomorphic processes of semi-arid piedmonts of the U.S.-Mexico border. Final Report. BIBE files.

Warnock, B.H. 1970a. Charts, measurement data and examination on selected A& M circular plots. BIBE files.

Warnock, B.H. 1970b. Summary of belt transect data at Big Bend National Park. BIBE files.

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Whitson, Paul D. 1965. Phytocoenology of Boot Canyon Woodland, Chisos Mountains, Big Bend National Park, Texas: Permanent Plot Supplement BIBE files.

Whitson, Paul D. 1989. Documentation and analysis of Boot Canyon permanent plots initiated in 1964. BIBE files.

B. FIRE RESEARCH NEEDED

The fire ecology program at Big Bend National Park will tailor the fire effects monitoring program to provide pertinent information for adaptive fire management. Research burns, by definition, will have a research component, which will include replicated treatments (a minimum of 3 treatment replications) that serve as either "controls" (untreated plots) and plots that receive the experimental treatment of prescribed fire, wildland fire use or mechanical thinning, herbicide application or some combination of treatments (i.e. burning + herbicide). Monitoring will also be conducted on fuels projects that are not designated as research to provide feedback as to whether or not natural, cultural or fire management objectives are being met and provide additional information to adaptively manage both wildland fire use and prescribed fire. First entry fuels treatment(s) into a monitoring type, will be considered research treatment having replicated treatment plots and replicated control plots.

A reasonable attempt will be made to address each of the following:

1. Effects of fire on plant community composition.
2. Effects of fire on rare or sensitive plant and animal species.
3. Soil movement, (NOTE: changes in plant composition can be used as a surrogate for soil sterilization (denuded surface) and soil movement =erosion) in response to fire.
4. Effects of fire on fuel loading, ladder fuels, and fuel size class distribution.
5. Forest stand age and size class structure. A Fire Effects Monitoring Plan for the Chihuahuan Desert National Park Units (AMIS, BIBE, CAVE, GUMO) will be drafted that will detail monitoring objectives and methods used for research and monitoring to provide scientifically credible data.

Legacy data collected in the past fifty years (e.g. Warnock 1970a, b; Whitson 1965, 1989; Dick-Peddie and Alberico 1977; Meents and Moir 1981, 1982; Wondzell and Ludwig 1983; Dunham 1996; Muldavin, et al., 2001) will be used to evaluate ecological trajectories and responses to fire. Whenever possible, existing plots from these studies will be re-measured and the resulting data added to the fire ecology database for

the park. Many of these data sets need to be organized, collated, and entered into modern electronic databases to be useful. In addition, many legacy plots will need to be re-located (found) based upon location descriptions in the initial reports. We will accomplish these tasks in advance of the implementation of Research Burns.

These research and monitoring goals will need to be funded by creative combination of resources, including NPS Resource Management funding, FIREPRO, CESU, and other government and NGO sources. Securing funding for adaptive management research is critical to the implementation of the Fire Management Plan.

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VIII PUBLIC SAFETY

Managing a fire management program is one of the highest risk operations that a land management agency accomplishes. The first priority consideration in any fire management action is firefighter and public safety.

Safety related issues in fire management are those of endangering humans to high rates of spread and high fire intensities that can occur in a normal fire season. Several programs concentrate on mitigating public and firefighter safety; fire prevention (fire hazard awareness and preparedness), prescribed fire (treatment of high fire risk areas with fire, thus increasing firefighter and public safety), fuel hazard reduction (using mechanical treatments for reduce hazardous fuels), etc. High-risk areas where the public or wildland firefighters are at risk are included in the planning for reducing the hazards.

A. PUBLIC SAFETY ISSUES AND CONCERNS

Safety of visitors, employees, and firefighters takes priority over all fire operations. All key fire personnel are issued the National Wildfire Coordinating Group *Fireline Handbook 410-1*. Consistent and accurate monitoring and evaluation of fire behavior is the basis for the contingency plans, contacts, and briefings that ensure public and personnel safety.

Over the years, visitors and employees generally have come to accept the park fire program. Actions taken to ensure safety have helped to gain this acceptance. Interpretation is vital to the public awareness and understanding of fire and its effects in the park. The fact that most neighboring ranchers and landowners use fire themselves serves to facilitate local acceptance of the park's fire management program.

Public safety is affected by the location of heavy visitor use areas and by human factors. The concentration of human use in Big Bend National Park is in areas where hazardous fuels exist, such as the Chisos Basin, employee residential areas, campgrounds, and visitor centers. There is only one roadway into the Chisos Basin. A fire starting near Route 14 could trap people in the Basin Developed Area by moving up Green Gulch and into the Basin. Some of the park's trails are in canyon bottoms which could be dangerous under certain conditions. A number of backcountry dirt roads receive considerable visitor use. These roads may become

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dangerous when fire is close at hand and fire suppression activities are being conducted in the area. The tendency for untrained personnel to become involved with suppression efforts must be recognized. Also, visitors could ignore warnings, or they may be unaware of the risk involved in fire, and tend to wander through burned areas. Sometimes even employees may not respect fire as a potentially dangerous event, particularly in low-intensity fires in fine fuels. All fire personnel must be intimately familiar with the "10 Standard Fire Orders" and the "18 Watch Out Situations."

All fires are routinely monitored and evaluated for safety as conditions change. If necessary, an area may be closed because of hazardous conditions. The Superintendent authorizes, and the Chief Ranger enforces, closures. All Divisions are expected to inform visitors and employees of potential dangers, closures, and regulations in the course of daily contact. On all management fires, the Prescribed Burn Boss is responsible for ensuring that closures and informational signs are properly posted.

The following is a list of public safety issues and concerns that are important to the BIBE:

- Visitor Safety during Fire Management activities.
- Highway traffic adjacent to Fire Management activities.
- Protection of the Wildland Urban Interface within the park.
- Safety for fire personnel and other park staff.

B. PUBLIC SAFETY MITIGATION MEASURES

The following public safety measures will be taken:

- Public safety concerns will be specifically address in each Wildland Fire Situation Analysis (WFSA), and Prescribed Fire Plan.
- Public safety messages should be developed as required and incorporated into the process of fire information dissemination.
- Trails and unimproved roads in the vicinity of wildland fires, and prescribed fires will be closed if potentially hazardous conditions are present to keep spectators at a safe distance.
- Traffic control measures, including smoke warning signs, flashing signal lights, traffic cones, and either fire or law enforcement personnel should be situated on roads where smoke intrusion incidents are anticipated to occur.
- Notification of local communities and adjacent landowners.

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IX PUBLIC INFORMATION AND EDUCATION

A. PUBLIC INFORMATION CAPABILITY

The public's right to know and their need to receive accurate information must be recognized. The key person for general information dispersal is the park's Public Information Officer (PIO), who generates press and public information releases from information supplied by the Incident Commander, Prescribed Fire Boss, or Fire Management Officer. The timely flow of information from the FMO to the PIO is essential. The Superintendent's office assures prompt distribution of pertinent fire information to both concession and in holder operations.

The general staff, with Interpretation taking the lead, is responsible for the dissemination of accurate fire information to the visiting public. This includes interpretation of the role of natural fire in Big Bend's ecosystem. In conjunction with the FMO and the Science and Resources Management Division, the Division of Interpretation develops opportunities to explain NPS wildland fire policy to the public. Particular attention is given to interpretation during actively burning fires, including management ignited prescribed fires. Park interpreters also inform the public of wildland fire policy and fire status through personal and non-personal services. Interpretive and fire status messages are for different purposes. They should be separate and distinct.

Keeping service personnel aware of fire management activities is essential to the effective dissemination of information to the general public. The entire park staff should be familiar with the Fire Management Plan, the park's role in wildfire suppression, and the employees' role in fire management. This is accomplished through an on-going education program which includes training, general employee meetings and active participation by park staff in Big Bend's wildland fire program.

All fire related activity will be reported immediately on Inside NPS, the official NPS website for agency personnel on the following website:

http://data2.itc.nps.gov/fire/admin/index/cfm

The report should cover mechanical/prescribed burns, WFUs, as well as Wildland fire, and be updated until the event ends. At the end of the event, an entry will be made to close out that activity. All Fire Management and Interpretation personnel should be able to make this activity report.

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Other federal agencies, as well as state and local agencies and park neighbors, have a vested interest in the park's fire activities. It is the responsibility of the Chief of Interpretation and Visitor Services to assure an open line of communication with all affected groups. During active fires, communications with other fire agencies and dissemination of information is the responsibility of the Information Officer working through the Incident Commander.

B. STEP-UP ACTIVITIES

Step-up public information activities in response to escalating fire danger or a fire activity includes fire danger signing and reporting this information in the park's daily report (both hard copy and radio broadcast). These methods inform Visitor Center staff and the public during contacts. All backcountry permits will have fire danger warnings attached. Backcountry users will be informed verbally at all visitor centers. Advisory notices will be posted at all visitor centers and other prominent locations. Park neighbors and cooperators will be notified of the fire danger. The Superintendent may issue a public closure as recommended by Fire Management, and this information will be communicated in similar fashion as fire danger.

An integral part of public education is the dispersion of current fire danger information through signs illustrating current fire danger, press releases, and other public announcements. It is important that the residents are made aware of current fire danger levels, and if signs are utilized they should be updated on a regular basis. Signing during prescribed fires is a useful safety tool as well as an aid in educating the public on fire. Other programs that can be incorporated into the BIBE that relate to Public Information and Education are:

- Incorporate the principles of fire's role in the ecosystems surrounding BIBE and the importance of fire as a resource management tool into any interpretive programs, exhibits, videos, interpretive trails through the Park, brochures, civic group presentations, school presentations, etc.
- Educate Park personnel on the nature, value and objectives of the fire program.
- Forward all fire-related press releases to the Park Superintendent and keep all NPS personnel informed.
- Develop and/or assist other wildland fire protection agencies with public information programs that promote the benefits of "Firewise" community planning, defensible space, mechanical fuel reduction, etc.

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- Establish rapport with local press and media representatives and accommodate all interview requests that will benefit BIBE by promoting the fire program.

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X PROTECTION OF SENSITIVE RESOURCES

Resource managers will continue reasonable efforts to avoid, minimize, and mitigate negative effects of the fire program. These include using best management practices under all alternatives to reduce impacts to human, cultural, and natural resources. Further, staff-developed prescriptions, desired fuel loads, and designation of FMUs, are developed to minimize and mitigate negative effects under the fire program. Despite these efforts there may be need for short-term or long-term rehabilitation following fire. Staff will consult with specialists (archeologists, hydrologists, plant ecologists, wildlife biologists) to determine the treatments needed and then write, implement and monitor these plans. Common rehabilitation for environmental resources actions include: flush cutting stumps, replanting trees, removing trash, brushing in fire lines, installing erosion control devices, felling hazardous trees, and carry out monitoring for short and long-term effects on vegetation and affected species. Below are measures specific to impact topics.

A. ARCHEOLOGICAL/CULTURAL/HISTORIC RESOURCES

Big Bend National Park contains extensive cultural resources which span the past 10,000 years. Thousands of prehistoric and historic archeological sites, ruins, and structures are found in the park. Many are poorly documented. It is essential that fire management activities do not disturb or destroy the cultural resources of the park. Less than 3% of the park has been surveyed for cultural resources and fire suppression has potential to negatively affect unidentified significant archeological sites. Suppression activities, particularly ground-disturbing methods, can damage significant archeological resources.

The historic districts, sites, and properties on the National Register of Historic Places, along with State Archeological Landmarks and other significant cultural resources, are classified as Historic Zones in the park's Statement for Management. For fire management purposes, the areas are to be protected and managed as suppression zones. The specific site locations of these resources are housed in the Division of Science and Resources Management.

The park's fire management program will not attempt to replicate prehistoric or historic fire use. This decision is based on the lack of reliable evidence that fire was used by indigenous people before the 20th century. While fire would have been used in the operations of farms and ranches during the historic period, maintaining the historic scene is not

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considered to be an essential part of the park's mission. The historical scene that immediately surrounds buildings will be maintained as prescribed by the Historic Resources Management Plan and the Resources Management Plan.

Highest priority for protection and preservation of cultural resources must be given to National Register properties, State Archeological Landmarks, proposed National Register properties, and properties identified as having potential for National Register listing. Location and construction of fire lines, helispots, fire camps, and mop-up operations should be monitored by professional archeologists. All fire control decisions will be made with input from a professional archeologist. Additionally, archeologist(s) will be involved in planning for management-ignited fire and during wildland fire suppression strategy sessions.

Archeological and historical sites which have not yet been evaluated may be generally prioritized from critical to non-critical. The following list serves as a **general** guideline for use by archeologists familiar with local park resources:

1. Archeological/Cultural Sites:

- Rock Art Site
- Special Use Site
- Calendric Site (astronomical alignment of stone, sight line, etc.)
- Pinnacle or Ridge Top "Vision Quest" Site ("sweat lodge" structure, non-habitation stone enclosure)
- Sheltered Habitation Site
- Boulder Shelter, Overhanging Cliff, Rock shelter, Cave
- Constructed Shelter (stone enclosure, pit house)
- Unsheltered Habitation Site
- Midden, and Midden Circle (ring midden, sotol pit, mescal pit, or agave pit having evidence of intensive, repeated or long duration occupation)
- Hearthfield (having repeated or long duration occupation)
- Open Campsite (with single or multiple hearths, of short duration occupation)
- Burial or Cemetery
- Lithic Procurement or Processing Site
- Casual Surface Procurement (non-extractive gathering)
- Lithic Quarry (mineral extraction)
- Lithic Workshop and Lithic Scatter

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2. Historic Sites

- Historic Commercial or Habitation Site (pre-1935 stone, adobe, and dugout structural remains or evidence)
- Historic Park Period Site (post-1935 park development buildings, camping features, CCC period structures and features)
- Non-habitation Ranching (corral, dipping vat, stock tank, etc.)
- Non-habitation Mining (prospect, shaft, audit, spoil pile, mineral processing, structures and features)
- Non-habitation Farming (irrigated farm land, diversion and distribution ditches, control gates, planed or terraced land, etc.)
- Candelilla Wax Camp (fire box, processed waste candelilla, etc.)

Actions to prevent or mitigate negative impacts:

- Locate and identify sites vulnerable to fire effects prior to prescribed burns or mechanical thinning. Use an archeologist that meets the Secretary of the Interior's standards.
- Follow protection measures for known cultural resource sites prior to prescribed burns, especially those vulnerable to fire and situated in or near the project area.
- Carry out post-fire surveys of natural ignitions whenever resources permit.
- Protect and report new sites found during and after burns. Identify known cultural resources park-wide to assist management of fire operations in future.
- Suppression operations are generally considered emergencies exempt from Sec. 106 requirements. Avoid ground disturbance during fire activities by identifying locations of potential natural firebreaks, spike campsites, and staging areas in previously surveyed areas. Do not construct fire control lines through cultural resource sites. Employ "Minimum Impact Suppression Tactics" whenever possible. Ensure an archeologist or similarly qualified resources person is consulted during fire activities.
- Reduce fuels with thinning, buffers and fuel breaks.
- Locate vehicular routes away from cultural resource sites.

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- Avoid using fire retardant near cultural resource sites.
- Work with tribes and work crews to protect ethnographic resources.
- Identify slash disposal areas away from all cultural resource sites.

B. PROTECTION OF SENSITIVE NATURAL RESOURCES

Actions to prevent or mitigate negative impacts:

- Conduct prescribed burns outside breeding seasons.
- Create patchy burns leaving mosaics of vegetation that are refuges for animals and sources of reseeding.
- Keep up-to-date survey records of special status species.
- Locate potential firebreaks, staging camps and spike camps ahead of fire.
- Avoid using aircraft where it might disrupt nesting.
- Add rare species to GIS databases and continuing to build knowledge of life histories.
- Use refueling stations that protect against gasoline spills.
- Carry out rehabilitation immediately after fire if needed.
- Restrict prescribed fire to low and moderate intensity.
- Use Minimum Impact Suppression Techniques whenever possible.
- Measures specific to support Mexican long-nose bat include burning when the bat is wintering in Mexico, ensure 80 percent of agaves are maintained by patchy prescribed burns or suppression of wildland fire if needed, consult resource specialist.
- Follow Recovery Plan guidelines for federally listed species.
- Measures specific to support black-capped vireo include thinning and prescribed burns to protect key occupied territories, continue monitoring and do research on why suitable sites are not occupied, suppress any wildland fire that threatens territories, conduct any nearby burn outside the nesting and fledgling season.
- Measures specific to support Chisos Mountain hedgehog cactus include ongoing research into population dynamics, establishment and the removal of buffelgrass near affected individuals or populations.
- Measures specific to support Big Bend gambusia include ongoing monitoring, periodic reduction of giant reed to

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prevent high-intensity fire, prevention of fuels and suppression chemicals from entering the ponds, protection of cottonwoods against fire, restoration, replanting, and other habitat augmentation if needed following fire.

- Manage wilderness in accordance with the Wilderness Act including: hand tools rather than mechanized tools and aircraft; fugitive retardant if it must be use; avoid spills, foam or erosion near water.
- Limit erosion following high-severity fire by creation of silt catchment devices at key points.

As personnel trained to identify and mitigate suppression impacts and recommend post-fire rehabilitation measures, resource advisors will assess burn areas that exceed 100 acres or fires of any size that occur in sensitive habitats. Sensitive habitats include habitat for state or federally listed species as well as locally rare plant communities such as in the High Chisos and desert riparian/spring areas.

C. MODERN INFRASTRUCTURE AND DEVELOPMENTS

Urban-interface mitigation techniques for eliminating and/or reducing potential wildland fire fuel hazards will be applied to prevent or reduce negative impacts to modern developments within and adjacent to the boundaries of the park. Considerable private development at Lajitas, in Terlingua Ranch and Study Butte does exist adjacent to Big Bend National Park. The owners of these properties, along with other members of the general public, will be informed of methods of acceptable wildland fuel hazard mitigation through the Park's public information programs and normal neighbor contact.

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XI FIRE CRITIQUES AND ANNUAL PLAN REVIEW

This Fire Management Plan and its appendices will be reviewed annually by the Fire Management Officer and other park or fire personnel as requested by the Fire Management Officer. The review will take place after the current fire season and before the next fire season. The purpose of this review is to assure that fire management planning documents are pertinent and up-to-date with current policy and operational procedures. Revisions will be undertaken as necessary to assure this purpose is met. Environmental documents will be revised or new documents will be prepared when plan revisions result in anticipated changes in the intensity or frequency of environmental impacts than discussed in the 2005 documents.

A. FIRE REVIEW

All wildland and prescribed fires will be reviewed in accordance with Director's Order-18 (2003) and Reference Manual–18, Chapter 13, Evaluation and Review (1999). The authority to convene a fire review rests with the park superintendent, regional director, or the Associate Director, Park Operations and Education. It is the clear responsibility of the park superintendent to call for a review, to insure timely completion, and to implement recommended actions

The after action review should identify what went right and where improvement is needed. The review is to identify areas that can be improved upon through training, change in procedure, improved communication, etc. Special recognition should be given to those that put forward extra effort to accomplish their duties and help meet the goals and objectives of the incident. Also any cooperators should be recognized. Any changes in procedure(s) should be made immediately and broadcast to all those that may be involved. Training deficiency should be corrected as soon as required training is available.

B. ANNUAL FIRE SUMMARY REPORT

The FMO will be responsible for completing an annual Wildland Fire Summary Report. The report will contain the number of fires by type, acres burned by fuel type, cost summary, personnel utilized, hours of aircraft used, and fire effects.

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XII CONSULTATION AND COORDINATION

The first internal scoping meeting for this project was held on December 11 & 12, 2002. Big Bend National Park personnel and staff from University of Arizona's School of Natural Resources reviewed an NPS Intermountain Region Environmental Screening Form, identified important park resources, and began discussing options for fire management. The research specialists from the University of Arizona's School of Natural Resources were added to this team (referred to below as the NPS/UA team) in order to assist with compiling information and writing the Environmental Impact Statement (EIS). An additional 5 internal meetings were held over the course of this project.

On June 10, 2003, a newsletter outlining the proposed EIS fire management alternatives and inviting comments was mailed out to 217 members of the public on the Big Bend NP mailing list. Public scoping meetings were held in Alpine and Study Butte, Texas on June 26-27, 2003. The team received few responses as a result of this newsletter and the scoping meetings.

The team began informal discussions with the U.S. Fish and Wildlife Service and the Texas Department of Parks and Wildlife on November 20, 2003 to identify species of concern. On January 27, 2004, the first informal review of Biological Assessment by USFWS began and on July 10, 2004, a second informal assessment of BA by US FWS began. On May 18, 2004, the Texas Parks and Wildlife Service began an informal review of draft BA.

In May, 2004 the park initiated consultation with TX SHPO for National Historic Preservation Act Section 106 compliance.

On 17 December, 2004 a Notice of Intent to change the Environmental Impact Statement (EIS) to an Environmental Assessment (EA) appeared in the Federal Register. The rational for change was that the assessment of effects was not significant for any of the impact topics identified for analysis. Park staff believed that the fire management plan would not be controversial, which was borne out by the few comments received from the public during the 30 day comment period.

The EA was reviewed by the NPS Intermountain Regional Office in May, 2005. A Cultural Resources Component was prepared and sent to the Texas State Historic Preservation Office, along with the EA, for review in June 2005 and concurred in a letter dated July 12, 2004. The BA and a copy of the EA was sent to the U.S. Fish & Wildlife Service office in Austin,

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for a review of the federally listed wildlife section on June 1, 2005, and a Biological Opinion was issued by the USFWS on September 20, 2005 under Consultation Number 2-15-00-F-0572.

The EA was made available for public comment on June 1, 2005 for 30-days. Six comments were received with none disagreeing with the findings of the EA. A Finding of No Significant Impact (FONSI) was signed the last week of September, 2005.

A. WILDLAND FIRE MANAGEMENT PLAN, AGENCIES CONSULTED

- Intermountain Regional Office, National Park Service
- Texas Parks and Wildlife Department
- Texas Forest Service
- Lincoln Zone Interagency Coordination Center
- US Fish and Wildlife Service
- Texas State Historical Preservation Office
- The Nature Conservancy of Texas

B. WILDLAND FIRE MANAGEMENT PLAN, PERSONS CONSULTED

- Harry Phillips, Center Manager, Lincoln Zone Interagency Dispatch Center, 420 Barrett St., Alamogordo, NM 89725

- Bill Davis, Regional Fire Coordinator, Texas Forest Service, Fort Stockton, TX

- Tom Santry, Emergency Management Coordinator, Brewster County, TX

C. WILDLAND FIRE MANAGEMENT PLAN PREPARATION

Five broad groups of people prepared the information for this FMP.

- *Interdisciplinary Team (IDT):* The IDT is composed of NPS staff that is ultimately responsible for carrying out the plan. The staff has expertise in natural and cultural resources, fire operations, park administration, and visitor services. The Big Bend team also included a partner from the University of Arizona who served as overall editor for the EA.

- *Other Agency Cooperators:* Development of the plan included consultation with U.S. Fish and Wildlife Service, and Texas Parks and Wildlife on threatened and endangered species. The Black Gap

Wildlife Management Area and Big Bend Ranch Park are being consulted about fire along park boundaries. The Texas State Historical Preservation Office was consulted about cultural resources.

- *Tribal Governments:* The seven tribes affiliated with the park are Apache Tribe of Oklahoma, Blackfeet, Comanche Tribe of Okalahoma, Kickapoo Traditional Tribe of Texas, Kiowa Tribe of Okalahoma, Mescalero Apache Tribe, and Ysleta Del Sur Pueblo.

- *Mexican Preserves:* The managers of the protected areas, Maderas del Carmen in the state of Coahuila, and Canyon de Santa Elena in the state of Chihuahua received notice of the park's planning process and were invited to participate. No comments were received. The preserve managers will continue to be invited to participate in planning meetings and efforts will be made to ensure they can attend meetings that jointly benefit management and operations of the park and preserves.

- *Interested Public*: The written comments of people who attended public scoping meetings, neighbors, and other interested members of the public have been considered during the development of the EA and FMP.

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APPENDICES

A: LITERATURE CITED

B: GLOSSARY

C: SPECIES LISTS

D: NEPA AND NHPA COMPLIANCE

E-1a: FIRE CALL-UP LIST

E-1b: FIRE QUALIFICATIONS

E-2: COOPERATIVE AGREEMENTS

F: WILDLAND AND PRESCRIBED FIRE MONITORING PLAN

G: PRE-ATTACK PLAN

H-1: LONG-TERM PRESCRIBED FIRE AND HAZARD FUEL REDUCTION PLAN

H-2: EXAMPLE PRESCRIBED BURN PLAN

I: FIRE PREVENTION PLAN

J: WEATHER STATION CATALOGUES

K: WILDLAND FIRE IMPLEMENTATION PLAN RESOURCES

L: BURNED AREA EMERGENCY STABILIZATION AND REHABILITATION PLAN

M: EXAMPLE DELEGATION OF AUTHORITY

N: INCIDENT COMPLEXITY ANALYSIS

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Appendix A

Literature Cited

Aldon, Earl F. 1975. Establishing alkali sacaton on harsh sites in the Southwest. *Journal of Range Management.* 28(2): 129-132.

Anable, M.E. M. McClaren, and G.B. Ruyle. 1992. Spread of introduced Lehmann lovegrass Eragrostis lehmanniana Nees. In Southern Arizona, USA. *Biological Conservation* 61:181-188.

Anderson, E.F., and R. Schmalzel. 1998. Study of the Bunched Cory Cactus (*Corypthantha ramillosa*). First Annual Report for FWS Agreement No: 1448-00002-96-0854. 38 p.

Anderson, E.F., and R. Schmalzel. 1997. Final Report on Lloyd's Mariposa Cactus Survey (*Sclerocactus[Neolloydia] mariposensis*). Prepared for Joint Task Force Six.

Anderson, H. E. 1982. *Aids to determining fuel models for estimating fire behavior*. USDA Forestry Service General Technical Report. INT-122. Intermt. Forestry and Range Experimental Station, Ogden, Utah 84401.

Ahlstrand, G. M. 1981. High country fire history. P. 1–22 in G. M. Ahlstrand, principal investigator. Ecology of fire in the Guadalupe Mountains and adjacent Chihuahuan Desert. Carlsbad Caverns and Guadalupe Mountains National Parks, Carlsbad, NM.

Ahlstrand, G. M. 1982. Response of Chihuahuan Desert mountain shrub vegetation to burning. *Journal of Range Management* 35:62–65.

Baisan, C.H. and T.W. Swetnam. 1995. Sandia/Manzano fire history final report. Tucson, AZ: Laboratory of Tree-Ring Research, University of Arizona, Tucson.

Baker, W.L. and D.J. Shinneman. Fire and restoration of pinyon-juniper woodlands in the western United States: a review. *Forest Ecology and Management* 189(2004):1-21.

Bell, G. P. 1986. Ecology and management of *Arundo donax*, and approaches to riparian restoration in southern California. The Nature Conservancy. (http://tncweeds.ucdavis.edu/esadocs/arundona.html).

Betancourt, J., T. Van Devender, and P. Martin. 1990. *Packrat Middens: the last 40,000 years of biotic change.* Tucson, AZ: University of Arizona Press.

`

Big Bend National Park. September 2004. General Management Plan/ Environmental Impact Statement. National Park Service, Department of the Interior.

Big Bend National Park. 2000. *Business Plan*. 21p.

Booth, T.P. 2001. Impacts of Global Change on Big Bend National Park, Texas. University of Arkansas. 24 p.

Bray, W.L. 1901. The Ecological Relations of the Vegetation of Western Texas. *Botanical Gazette* 32(4): 262-291

Brooks, M. L. and D. A. Pyke. 2001. Invasive plants and fire in the deserts of North America. Pages 1–14 in K. E. M. Galley and T. P. Wilson (eds.), Proceedings of the Invasive Species Workshop: The Role of Fire in the Spread and Control of Invasive Species. Fire Conference 2000: The First National Congress on Fire Ecology, Prevention, and Management. Miscellaneous Publication No. 11. Tall Timbers Research Station, Tallahassee, FL.

Brown, D. E. 1994*. Biotic Communities. Southwestern United States and Northwestern Mexico.* Salt Lake City: University of Utah Press.

Brown, J. 2000. Ecological Principles, Shifting Fire Regimes and Management Considerations. In Wildland Fire in Ecosystems. Effects of Fire on Flora. USFS. Rocky Mountain Research Station. General Technical Report RMRS-GTR-42 volume 2. pp. 185-203.

Cable, D.R. 1975. Influence of precipitation on perennial grass production in the semidesert southwest. *Ecology* 56:981-986.

Carpenter, A.T. 1999. Element stewardship abstract for *Tamarix* spp. The Nature Conservancy. (http://tncweeds.ucdavis.edu/esadocs/documnts/tamaram.pdf).

Council on Environmental Quality (CEQ). 1978. Regulations for Implementing NEPA. (http://ceq.eh.doe.gov/nepa/regs/ceq/toc_ceq.htm).

Cornelius, J.M. 1988. Vegetation response to a fire in a northern Chihuahuan desert grassland. Ph.D. Thesis. New Mexico State University, Las Cruces, NM.

Dick-Peddie, W.A. 1993. New Mexico Vegetation: past, present and future. Albuquerque: University of New Mexico Press.

`

Dick-Peddie, W.A and M. S. Alberico (1977). Fire Ecology Study of the Chisos Mountains, Phase 1. Chihuahuan Desert Research Institute. Records at Big Bend National Park.

Drewa, P.B., and K.A. Havstad. 2001. Effects of fire, grazing, and the presence of shrubs on Chihuahuan desert grasslands. *Journal of Arid Environments*. 48: 429-443.

Elias, S.A. 1997. *The Ice-Age History of Southwestern National Parks*. Washington; London: Smithsonian Institution Press. 200p.

Fulcher, W. 1959. *The Way I Heard It*. Austin, TX: University of Texas.

Fule, P.Z., A.E. Cooke, T.A. Heinlein, and W.W. Covington. 2004 Effects of an Intense Prescribed Forest Fire: Is it Ecological Restoration? *Restoration Ecology* Vol. 12 (2): 220-230. June

Gatewood, R. Environmental Assessment for Management Ignited Prescribed Fires for 2002-2003. Big Bend National Park. Park files.

Gomez, A.R. 1991. *A Most Singular Country. A History of Occupation in the Big Bend*. NPS Department of the Interior, Santa Fe, NM. A Charles Readd Monograph in Western History No. 18. Brigham Young University. 241p.

Guertin, P. and W. Halvorson. 2004. Survey of buffelgrass (*Pennisetum ciliare*) in Big Bend National Park, Texas. Conducted through USGS Sonoran Desert Field Station.
Hastings, J.R and R.M Turner. 1965. *The Changing Mile: an ecological study of vegetation change in time in the lower mile of an arid and semiarid region*. Tucson: University of Arizona Press.

Havstad, K.M. An Overview of Arid Grasslands in the Chihuahuan Desert. In symposium proceedings, The Future of Arid Grasslands: Identifying Issues, Seeking Solutions. Tucson, Arizona, October 13-16, 1996. USDA/USFS. Rocky Mountain Research Station, Ft. Collins, CO. RMRS-P-3

Howard, W.E., R.L. Fenner, and H.E. Childs, Jr. 1959. Wildlife survival in brush burns. *Journal of Range Management.* 12:230-234

Huff, M.H. and J.K. Smith. Fire Effects on Animal Communities. In *Wildland Fire in Ecosystems. Effects of Fire on Fauna*. 2000. USDA/USFS. Rocky Mountain Research Station. General Technical Report RMRS-GRT-42-Volume 1. pp 35-42.

`

Humfrey, R.J. Fire in the Deserts and Desert Grasslands of North America. In Fire and Ecosystems (T.T. Kozlowski and C.E. Ahlgren) San Francisco: Academic Press 1974. pp. 365-399.

Jones, A. T. 2000. Bibliography of Fire Effects on Cultural Resources. Western Region Archeological Conservation Center, National Park Service, Tucson, Arizona.

Kaib, M., C.H. Baisan and T.W. Swetnam. Historical Patterns of Surface Fire in Canyon Pine-Oak Forests, Savannas, and Intervening Semiarid Grasslands of the Southwest Borderlands: An Abstract of Work in Progress. In symposium proceedings, The Future of Arid Grasslands: Identifying Issues, Seeking Solutions. Tucson, Arizona, October 13-16, 1996. USDA/USFS. Rocky Mountain Research Station, Ft. Collins, CO. RMRS-P-3

Kaufmann, M.R., L.S. Huckaby, C.M. Regan and J. Popp. Forest Reference Conditions for Ecosystem Management in the Sacramento Mountains, New Mexico. USDA Forest Service General Technical Report. RMRS-GTR-19. September 1998, 87p.

Kittams, W. H. 1972. Effect of fire on vegetation of the Chihuahuan Desert region. P. 427–444 in Proceedings Annual Tall Timbers Fire Ecology Conference, June 8–9, 1972.

Langford, J.O. and F. Gipson. 1952. *Big Bend. A Homesteader's Story*. Austin, TX: University of Texas.

Lair, K and S. Wynn. 2002. *Revegetation Strategies and Technology Development for Restoration of Xeric Tamarix Infestation Sites Following Fire*. U.S. Dept. Of the Interior, Bureau of Reclamation, Technical Service Center, Denver, CO. Technical Memorandum No. 8220-02-06.

Leopold, Aldo, S., S. A Cain, C. M. Cottam, I. N. Gabrielson and T. L. Kimball. 1963. Wildlife management in the National Parks. In Administrative Policies of the National Park Service. Washington, D.C.

Lyon, L.J, E. S. Telfer, and D.S. Schreiner. Direct Effects of Fire and Animal Responses. In *Wildland Fire in Ecosystems. Effects of Fire on Fauna*. 2000. USDA/USFS. Rocky Mountain Research Station. General Technical Report RMRS-GRT-42-Volume 1. pp 17-23.

Lyon, L.J, M.H. Huff, E.S. Telfer, D.S. Schreiner, and J.K. Smith. Fire Effects on Animal Populations. In *Wildland Fire in Ecosystems. Effects of Fire on Fauna*. 2000. USDA/USFS. Rocky Mountain Research Station. General Technical Report RMRS-GRT-42-Volume 1. pp 25-34.

`

Maresh, J. Spring 2003. Survey of Black-capped Vireo, Big Bend National Park, Brewster County, Texas. Report to the National Park Service.

Maya, Y. and L. Arriga. 1996. Litter and phonological patterns of the dominant overstory species of a desert scrub community in northwestern Mexico. *Journal of Arid Environments* 34: 23-35.

McDougal, William B., W. P. Taylor and W. B. Davis. 1944. Memorandum, June 13,1945 on a Preliminary Report of an Ecological Survey of Big Bend National Park. On file: Office of Science and Resource Management and Natural History Library. Big Bend NP.

McKernan, P. 2003. The Effect of Fire on Grass and Shrub Cover in Big Bend National Park, Texas. MS Thesis, Department of Biology, Baylor University, Waco, Texas.

Maxwell, R.A. 1994. *The Big Bend of the Rio Grande. A Guide to the Rocks, Landscape, Geologic History, and Settlers of the Area of Big Bend National Park*. Bureau of Economic Geography, University of Texas. 138 p.

McPherson, Guy, R. 1995. The role of fire in desert grasslands. In *The Desert Grasslands*. M. P. Mclaren and T. R. Van Devender (eds). Tucson, AZ: University of Arizona Press.

Moir, W. H. 1982. A Fire History of the High Chisos, Big Bend National Park, Texas. *Southwestern Naturalist* 27: 87-90.

Muldavin, E., S. Wondzell and J. Ludwig. 2001. Forty Years of Vegetation Change in Desert Grasslands of the Big Bend National Park. Big Bend NP files.

Nabi, A.A. 1978. Variation in successional status of pinyon-juniper woodlands of the Great Basin. Logan, Utah: Utah State University. Thesis 126p.

NPS Director's Order #12. 2001. Conservation Planning, Environmental Impact Analysis, and Decision Making. Washington D. C.: U.S. Department of Interior.

NPS. 2001. Exotic Plant Management Team Annual Report. Biological Resource Management Division.

NPS Director's Order #18. 1998. Wildland Fire Management.

`

NPS 2002. Wildland Fire Management Reference Manual 18. Version 3. November 5, 2002.

NPS. 2003. Fire Monitoring Handbook. Boise (ID): Fire Management Program Center, National Interagency Fire Center. 274 p.

Newman, D. 1993. Element stewardship abstract for *Sorghum halepense*. The Nature Conservancy. http://tncweeds.ucdavis.edu/esadocs/documnts/sorghal.rtf

Patton, D.R. 1992. *Wildlife Habitat Relationships in Forested Ecosystems*. Portland, OR: Timber Press Inc. p. 392.

Paysen, T. E., R. J. Ansley, J. K. Brown, G. J. Gottfried, S. M. Haase, M. G. Harrington, M. G. Narog, S. S. Sackett, and R. C. Wilson. 2000. Fire in western shrubland, woodland, and grassland ecosystems. P. 121–159 in J. K. Brown and J. K. Smith, editors. Wildland Fire in Ecosystems: Effects of Fire on Flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. USDA Forest Service, Rocky Mountain Research Station, Ogden, Utah. 257 p.

Powell, A. M. *Trees and Shrubs of the Trans-Pecos and Adjacent Areas*. 1998. Austin: The University of Texas Press

Richter, B.S., and J.C. Stultz. 2002. Mychorrhizal innoculation of big sacaton: Implications for grassland restoration of abandoned agricultural fields. *Restoration Ecology* 10(4):607-616

Robbins, L.E., and R.L. Myers. 1992. Seasonal effects of prescribed burning in Florida: a review. Misc. Pub. No. 8. Tall Timbers Research, Inc., Tallahassee, FL. 96 p.

Sandberg, D. V., R. D. Ottmar, J. L. Peterson, and J. Core. 2002. Wildland fire on ecosystems: effects of fire on air. Gen. Tech. Rep. RMRS-GTR-42-vol. 5. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT.

Schmalzel, R., E.T. Anderson, K. Rice, and P. Quirk. 1999. Study of the Bunched Cory Cactus (*Coryphantha ramillosa* Cutak). Final Report Conducted by the Desert Botanical Garden, Phoenix under FWS Agreement No: 1448-00002-96-0854. 59 p.

Scifres, Charles, J. and Wayne T. Hamilton.1993. *Prescribed Burning for Brushland Management. The South Texas Example*. College Station: Texas A & M University Press. 245 p.

`

Schmidley, D. J. 2002. Te*xas Natural History. A Century of Change*. Lubbock, TX: Texas University Press. p.534.

Schmidt, R.H. 1986. Chihuahuan Climate. Pp.40-63. In *Second Symposium on Resources of the Chihuahuan Desert Region, United States and Mexico.* J.C. Barlow, A.M. Powell, and B.N. Timmermann, Chihuahuan Desert Institute, Alpine, Texas.

Scurlock, D. From the Rio to the Sierra: An Environmental History of the Middle Rio Grande Basin. USDA Forest Service General Technical Report. RMRS-GTR-5. May 1998.

Sexton, T., and J. Boone. 1999. Review of Big Bend Prescribed Fire Program. BBNP files.

Sirotnak, J. 1998. Report on Exotic Plants in Big Bend National Park. Internal Report. Big Bend National Park files.

Singer, F.J., W. Schreier, J. Oppenheim, and E.O. Garton. 1989. Drought, fires and large mammals. *Bioscience* 39:716-722.

Sprugel, Daniel. 1991. Disturbance, Equilibrium, and Environmental Variability: What is 'Natural' Vegetation in a Changing Environment? *Biological Conservation* 58(1991) 1-18.

Swetnam, T.W. 1990. Fire history and climate in the southwestern United States. Krammes, J.S., tech. Coordinator. Proceedings of the symposium, Effects of fire management of Southwestern natural resources. 1988, Nov 17-18, Tucson, AZ. USDA Forest Service GTR-RM-191.

Swetnam, T.W., and C. H. Baisan. 1996. Historical fire regimes in the southwestern United States since AD 1700.In Allen, C.D. (ed) Fire effects in southwestern forests: proceedings of the second La Mesa fire symposium; 1994 March 29-31; Los Alamos NM. General Technical Report RM-GTR-286. Fort Collins, CO: US Department of Agriculture, Forest Service. Rocky Mountain Forest and Range Experiment Station: 11-32.

The Fire Behavior Field Reference Guide. Feb 1992. Publication of the National Wildfire Coordinating Group: National Interagency Fire Center, Boise Idaho. Govt. Publication No. PMS436-4

Trabaud, L. (ed). 1987. *The Role of Fire in Ecological Systems*. The Hague, Netherlands: SPB Academic Publishing. 157 p.

`

Tu, M. 2002. Element stewardship abstract for *Cenchrus ciliaris* L. The Nature Conservancy. (http://tncweeds.uncdavis.edu/esadocs/documnts/cenccil.pdf.)

Tyler, R. 1975. *The Big Bend. A History of the Last Texas Frontier*. Washington, D.C: NPS Department of the Interior.

NPS. 2003. Fire Monitoring Handbook. Boise (ID): Fire Management Program Center, National Interagency Fire Center. 274 p.

U.S. Forest Service Fire Effects. Site Accessed 12-14 October, 2003 and 23-30 March, 2004. Web Site. http://www.fs.fed.us/database/feis/plants/graminoid/arudon/botanical_and_ecological_characteristics.html

Van Devender, T.R. 1986. Pleistocene climates and endemism in the Chihuahuan Desert flora. pp.1-19. In *Second Symposium on Resources of the Chihuahuan Desert Region, United States and Mexico.* J.C Barlow, A.M. Powell, and B.N. Timmermann, Chihuahuan Desert Institute, Alpine, Texas.

Van Devender, T.R. 1990. Late Quaternary Vegetation and Climate of the Chihuahuan Desert, United States and Mexico. Pp.104-133. In *Packrat Middens: The Last 40,000 Years of Biotic Change*. J.L. Betancourt, T.R. Van Devender, and P.S. Martin, (eds). Tucson, AZ: University of Arizona Press.

Van Devender, T.R and T.L. Burgess. 1985. Late Pleistocene woodlands in the Bolson de Mapimi: A refugium for the Chihuahuan Desert biota? *Quaternary Research* 24:340-353.

Van Devender, T.R. and W.G. Spalding. 1979. Development of vegetation and climate in the Southwestern United States. *Science* 204:701-710.

Wauer, R. and D. Riskind (eds). 1974. *Transactions of the Symposium on the Biological Resources of the Chihuahuan Desert Region. United States and Mexico*. Sul Ross State University, Alpine, TX. U.S. Department of the Interior. NPS Transactions and Proceedings Series. Number three, 1977.

Wauer, R. and J. D. Ligon. Distributional Relations of Breeding Avifauna of Four Southwestern Mountain Ranges. In *Transactions of the Symposium on the Biological Resources of the Chihuahuan Desert Region. United States and Mexico*. Sul Ross State University, Alpine, TX. U.S. Department of the Interior. NPS Transactions and Proceedings Series. Number three, 1977. pp. 567-578.

`

Wells, P. and V. Post. Glacial Origins of the Present Chihuahuan Desert Less than 11,500 Years Ago. In *Transactions of the Symposium on the Biological Resources of the Chihuahuan Desert Region. United States and Mexico*. Sul Ross State University, Alpine, TX. U.S. Department of the Interior. NPS Transactions and Proceedings Series. Number three, 1977. pp. 67-84.

Welsh, M. 2002. *Landscape of Ghosts – River of Dreams*. An Administrative History of Big Bend National Park. Boulder: University of Colorado Press.

Whelan, R.J. 1995. *The Ecology of Fire*. Cambridge, England: Cambridge University Press.

Wildland Fire in Ecosystems. Effects of Fire on Flora. 2000. USFS. Rocky Mountain Research Station. General Technical Report RMRS-GTR-42 volume 2.

Williams, C.T., 1995. The Effects of Two Recent Fires on a Chihuahuan Desert plant community in the vicinity of Panther Junction, Big Bend National Park, Texas. Department of Environmental Science. Fort Worth, TX, Texas Christian University. 63 p.

Wondzell, S.M., G.L. 1996. Cunningham and D. Bachelet. Relationships between landforms, geomorphic processes and plant communities on a watershed in northern Chihuahuan Desert. *Landscape Ecology* 11 (6): 351-362

Wright, H.A and A. W. Bailey. 1982. Fire Ecology in United States and Southern Canada. New York: John Wiley & Sons. 501p.

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Appendix B Glossary

The NWCG Glossary (2005) is the reference document for fire terminology. It provides the wildland fire and fire use communities a single source document that covers wildland fire, prescribed fire, fire use and incident management terminology commonly used by the National Wildfire Coordinating Group (NWCG) and its Working Teams. The following glossary is not the NWCG glossary, but a summary of terms from this Fire Management Plan.

Glossary

Appropriate Management Response (ARM)	Any specific action suitable to meet Fire Management Unit (FMU) objectives. Typically, the AMR ranges across a spectrum of tactical options (from monitoring to intensive management actions). The AMR is developed by using Fire Management Unit strategies and objectives identified in the Fire Management Plan.
Biological Assessment (BA)	An assessment presented to U.S. Fish and Wildlife Service of effects on federally listed species, proposed listed species, or critical habitats of proposed federal actions that are not major construction projects (in this particular case, implementing a new FMP is the proposed action)
Biological Opinion (BO)	The opinion of the U.S. Fish and Wildlife Service on whether or not a proposed federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat
Context	The geographical or temporal environment of a proposed action, such that a change in the action relative to space or time might alter impacts
Control, contain, confine	A sequence of progressively less aggressive actions applied to wildland fire. *Control* consists of actions to suppress fire including installing firelines and suppressing hot spots, *contain* keeps fire within established boundaries and *confine* typically allows fire to burn itself out within a natural or constructed fireline.
Cultural Landscape	Landscapes as affected by people through time— the definition of such captures overlapping occupancy by different groups of people

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Glossary

Cultural Resources	Valued aspects of a cultural system that might be tangible (districts, sites, structures, objects)
Cultural Resources Component (CRC)	Document analyzing effects of the proposed action on cultural resources for review by the State Historic Preservation Office
Cumulative Effect	Effects of actions (those in the past, present, or reasonably foreseeable future) that have an additive impact on the resources affected by the proposed action
Debris Flow	"Rivers" of earth, rock, and debris saturated with water; one cause is intense summer thunderstorms following removal of organic matter from soils by fire
Direct Effect	An impact that occurs as a result of the proposed action or alternative in the same place and at the same time as the action
Duration	The length of time of effects of an action
Duff	Decomposing organic matter lying beneath the litter layer and above mineral soil
Ecoregion	A large-scale area with a common geological and biological history
Exotic Species (also non-native)	Species not native to a particular ecosystem
Fire break	A natural or manmade barrier to fire, such as a river, road, or excavated line, that is devoid of flammable vegetation
Fuel continuity	Describes how connected fuels are horizontally across the ground and vertically into canopies; continuous fuels support fire spread
Fire frequency/return interval/ fire cycle	The recurrence of fire in a given area/habitat over time
Fire intensity	The amount of energy released by the fire usually measured as per unit length of fire front; reported as low, moderate or high
Fuel moisture	Most important determinant of flammability; varies daily within plants but over a lifetime plants become drier and more flammable as they mature

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Glossary

Fire severity	Qualitative measure of mortality and survival on above ground plants and animals and below ground effects on loss of organic matter; determined by heat released; little organic matter is removed or tree canopy scorched under low severity, while high severity signals very hot burns removing soil organic matter and burning forest canopy
Fire Management Plan (FMP)	The plan that guides all fire-related activities at a park that is consistent with land and resource management plans and follows NPS guidelines
Fire Management Unit (FMU)	A delineated area of the park that permits particular fire management strategies
Fuel	Vegetation, both living and dead, capable of burning
Fuel management	The use of methods such as prescribed fire and manual and mechanical means to reduce flammable vegetation that accumulates over time
Impairment	Impacts on resources that negatively, significantly, and possibly irreversibly alter their character from the state that made them important to protect in a park
Ground fire	Burns down through the litter into the duff and organic matter; can kill roots and destroy soil seedbanks
Indirect effect	An impact that occurs as a result of the proposed action, but removed in time and space from the action
Intensity	Magnitude of effect, from low to high
Inter-disciplinary team (IDT)	Group of interdisciplinary specialists that identifies important issues, relationships, and alternatives for public scrutiny
Manual fuel reduction	Removal of vegetation or creation of fire breaks using hand tools and chainsaws
Mechanical fuel reduction	Removal of vegetation or creation of fire breaks by bulldozer or road grader
Minimum requirement	The lowest impact means of accomplishing a task, frequently considered with respect to wilderness
Mitigation	Modification of an action that lessens intensity of its impacts on a particular resource

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Glossary

Monitoring program	Collecting information in a systematic way on species, species distribution, growth, fuel loading and health, archeological remains, before and after prescribed burning and after natural ignitions
National Environmental Policy Act (NEPA)	The 1969 law that dictates the objective analysis and public scrutiny of the environmental as well as social and economic impacts of proposed federal actions and their alternatives prior to implementation
Natural resources	A feature of the natural (physical and biological) environment that has value to humans
No Action	Under NEPA, No Action continues the current planning and operational direction and provides a baseline against which other alternatives can be measured
Non-fire treatments	Removal of vegetation without using fire, most commonly through mechanical/manual means including mowing, slashing, chainsaws or herbicidal treatments
Non-native species	Species not native to a particular ecosystem (used like "exotic")
Prescribed fire	Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements (where applicable) must be met, prior to ignition.
Prescription	Measurable environmental criteria, particularly temperature, relative humidity, wind speed and direction, and fuel moisture, that define the conditions under which a fire would be ignited by management, guide selection of appropriate management responses, and indicate other required actions
Research burn	Prescribed burns with greater investment in examining, recording, analyzing, evaluating and applying monitoring results of fire effects and fire dynamics to management decisions
Resource advisor	An expert in a particular resource area (such as an archeologist or botanist) who is brought on site to advise fire crews relative to protecting sensitive resources
Rhizome	Creeping stem growing beneath the soil surface sending up new leaf shoots from nodes; characteristic of lechuguilla, saltcedar and Bermuda grass

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Glossary

Root crown	Mass of woody tissues from which stems and roots originate; usually applied to shrubs and herbaceous plants; often indicates drought tolerance and ability to resprout after fire
Scoping	Compilation of knowledge and opinions in order to properly develop and decide on alternative courses of action, both internally to the park and externally with the public
Sensitive species	Species sensitive to perturbation from the proposed action, frequently rare species that are federal or state-listed, proposed for listing, occurring in very few places, or particularly sensitive to the action's impacts
Species diversity	A measure of the number of species in an area (species richness) that also accounts for species abundance
State Historic Preservation Office	The state office overseeing protection of cultural resources
Succession	The natural evolution of biotic communities over time following disturbance
Suppression	All the work of extinguishing a fire beginning with its discovery, using confine, contain, and control actions
Thinning	Reduction of density of vegetation, frequently using non-fire means
Timing	How effects vary depending on when the action takes place
U. S. Fish and Wildlife Service	U.S. Department of Interior agency charged with overseeing protection of threatened and endangered species
Unique Sites	Sites sufficiently uncommon such that their presence is a special feature of the park with intrinsic value and of interest to visitors
Unique Stands	Patches of vegetation that are uncommon in an area that may be relicts from an earlier age
Watershed	Land above a given point in a drainage that potentially contributes water to the streamflow at that point
Wilderness	Designated area managed to perpetuate natural processes and minimize human impacts
Wildfire	An unplanned, unwanted wildland fire including

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Glossary

	unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out.
Wildland fire	Any non-structure fire that occurs in the wildland. Three distinct types of wildland fire have been defined and include wildfire, wildland fire use, and prescribed fire.
Wildland Fire Use (WFU)	The application of the appropriate management response to naturally-ignited wildland fires to accomplish specific resource management objectives in pre-defined designated areas outlined in Fire Management Plans. Operational management is described in the Wildland Fire Implementation Plan (WFIP).

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Appendix C Species List

Plant and Animal Species referred to in this FMP
Acorn woodpecker (*Melanerpes formicivorus*)
Alkali sacaton (*Sporobolus airoides*)
Alligator juniper *(Juniperus deppeana)*
Arizona cypress (*Cupressus arizonica)*
Beaver (*Castor canadensis*)
Bear grass or Sacahuista (*Nolina microcarpa*)
Beebrush (*Aloysia gratissima*)
Bermuda grass (*Cynodon dactylon)*
Big Bend gambusia (*Gambusia gaigei*)
Bighorn desert sheep (*Ovis canadensis* spp.)
Bigpod bonamia (*Bonamia ovalifolia*)
Bigtooth maple *(Acer grandidentatum)*
Black bear (*Ursus americanus mexicanus*)
Black-capped vireo (*Vireo atricapilla)* Federally listed requiring reasonable and prudent measures.
Black grama *(Bouteloua eriopoda)*
Black phoebe (*Sayornis nigricans*)
Black-tailed jackrabbit (*Lepus californicus*)
Black-tailed rattlesnake (*Crotalus molossus)*
Blue grama *(Bouteloua gracilis)*
Bobcat (*Lynx rufus*)
Broadtail hummingbirds (*Selasphorus platycercus*)
Buffelgrass (*Pennisetum ciliare)*
Bull mushily (*Muhlenbergii emersleyi*)
Bunched cory cactus (*Coryphantha ramillosa)*
Bushtits (*Psaltriparus minimus*)
Cactus wren (*Campylorhynchus brunneicapillus*)
California cottontop (*Digitaria californica*)
Candelilla (*Euphorbia antisyphilitica)*
Catclaw Acacia *(Acacia constricta)*
Catclaw Mimosa (*Mimosa aculeaticarpa var. biuncifera*)
Ceniza (*Leucophyllum minus*)
Chino grama *(Bouteloua breviseta*)
Chisos agave (*Agave glomeruliflora*)
Chisos coral root (*Hexalectris revoluta*)
Chisos hophornbeam (*Ostrya chisosensis*)
Chisos metalmark (*Apodemia chisosensis*)
Chisos Mountain or Lateleaf oak (*Quercus tardifolia)*
Chisos Mountain hedgehog cactus (*Echinocereus chisoensis* var*. chisoensis*) Federally listed requiring reasonable and prudent measures.
Chisos pinweed (*Lechea mensalis)*

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Chaffey's cory cactus (*Escobaria* var*. chaffeyi)*
Coachwhip snake (*Masticophis flagellum***)**
Coahuila oak (*Quercus polymorpha*)
Colima warbler (*Streptanthus cutleri)*
Common black hawk (*Buteogallus anthracinus***)**
Common reed (*Phragmites australis***)**
Cottonwood (*Populus deltoides* var*. fremontii)*
Coyote (*Canis latrans*)
Creosote (*Larrea tridentata)*
Curve-billed thrasher (*Toxostoma curvirostre*)
Cutler's Twistflower (*Streptanthus cutleri)*
Dalea spp. (approximately 12 species)
Deer muhly (*Muhlenbergia rigens)*
Dense cory cactus (*Escobaria dasyacantha* var*. dasyacantha)*
Desert willow (*Chilopsis linearis*)
Dog cholla (*Opuntia schottii*)
Douglas fir *(Pseudotsuga menziesii)*
Duncan's cory cactus (*Coryphantha duncanii)*
Elf owls (*Micrathene whitneyi*)
Emory oak (*Quercus emoryi)*
Evergreen sumac ((*Rhus virens* var. *choriophylla*)
Fragrant ash (*Fraxinus cuspidata*)
Giantreed (*Arundo donax)*
Glass Mountain coral root (*Hexalectris nitida)*
Gnatcatchers (*Polioptila caerulea*)
Golden eagle (*Aquila chrysaetos***)**
Golden-spined prickly pear (*Opuntia aureispina)*
Graves oak (*Quercus gravesii)*
Gray breasted jay (*Aphelocoma ultramarina*)
Gray fox (*Urocyon cinereoargenteus*)
Gray hawk (*Asturina plagiata*)
Gray oak (*Quercus grisea)*
Greater western mastiff bat (*Eumops perotis californicus)*
Green sprangletop (*Lepochloa dubia*)
Guayacan *(Guaiacum angustifolium)*
Guadalupe fescue (*Festuca ligulata*)
Hairy grama *(Bouteloua hirsuta)*
Harvard agave (*Agave harvardiana*)
Harvard's stonecrop (*Sedum harvardii)*
Harvard plum (*Prunus harvardii*)
Hetchia or falseagave (*Hechtia texensis)*
Hinckley's oak (*Quercus hinckleyi*)
Javalina (*Pecari tajacu)*
Johnson grass (*Sorghum halepense)*
Leatherstem (*Jatropha dioica*)
Lechuguilla (*Agave lechuguilla)*

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Lehmann lovegrass (*Eragrostis lehmanniana)*
Little-leaf brogniartia (*Brogniartia minutifolia)*
Lloyd's Mariposa cactus (*Sclerocactus mariposensis*)
Loggerhead shrike (*Lanius ludovicianus*)
Long-spur colombine (*Aquilegia longissima)*
Lovegrass (*Eragrostis* spp.)
Mariola *(Parthenium incanum)*
Mesquite *(Prosopis glandulosa)*
Mexican buckeye (*Ungnadia speciosa*)
Mexican gray wolf (*Canis lupus baileyi)*
Mexican long-nosed bat (*Leptonycteris nivalis*) Federally listed requiring reasonable and prudent measures.
Mexican pinyon (*Pinus cembroides*)
Mexican spadefoot toad (*Spea multiplicata*)
Mockingbird (*Mimus polyglottos)*
Mountain lion (*Puma concolor)*
Mountain mahogany (*Cercocarpus montanus*)
Mule deer (*Odocoileus hemionus*)
Netleaf oak (*Quercus rugosa*)
Northern Aplomado falcon (*Falco femoralis septentrionalis)*
Northern flicker (*Colaptes auratus*)
Ocotillo *(Fouqueria splendens)*
Peregrine falcon (*Falco peregrinus)*
Pinyon ricegrass (*Pipochaetum fimbriatum*)
Ponderosa pine *(Pinus ponderosa)*
Prickly pear (*Opuntia* spp.)
Puckering nightshade (*Nectouxia formosa)*
Purple gay mallow (*Batesimalva violacea)*
Redberry juniper (*Juniperus pinchottii)*
Red oak (*Quercus rubra)*
Resurrection fern (*Selaginella lepidophylla*)
Rio Grande leopard frog (*Rana berlandieri*)
Roadrunner (*Geococcyx californianus*)
Robert's stonecrop (*Sedum robertsianum)*
Rock Squirrel (*Spermophilus variegates)*
Rufous towhe (*Pipilo erythrophthalmus)*
Russian thistle (*Salsola kali)*
Saltcedar (*Tamarix ramossissima)*
Scott's oriele (*Icterus parisorum*)
Screech owls (*Otus asio)*
Screwbean *(Prosopis pubescens)*
Scrub Oak (*Quercus turbinella*)
Sea urchin cactus (*Echinocactus asterias*)
Shorthorn jefea (*Jefea brevifolia)*
Shrubby groundsel (*Baccharis halimifolia)*
Sideoats grama *(Bouteloua curtipendula)*

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Sierra del Carmen oak (*Quercus carmenensis)*
Sierra del Carmen whitetail deer (*Odocoileus virginianus)*
Silver-spined cholla (*Opuntia imbricata* var*. argentea)*
Skeletonleaf goldeneye (*Viguiera stenoloba*)
Slender Oak or Chisos oak (*Quercus graciliformis)*
Slimleaf vauquelinia (*Vauquelinia corymbosa* subsp. *angustifolia*)
Slimleaf rosewood (*Vauquelinia corymbosa* var. *heterodon)*
Southwestern willow flycatcher (*Empidonax traillii extimus*)
Sotol *(Dasylirion wheeleri)*
Striped Skunk (*Mephitis mephitis*)
Swallow spurge (*Chamaesyce golondrina)*
Tall-stemmed paintbrush or Squawflower (*Castilleja elongata* or *C. integra* var*. integra*, taxonomy questionable*)*
Tarbush *(Flourensia cernua)*
Texas antelope (*Antilocapra americana* and *A. mexicana)*
Texas hornshell (*Popenaias popei*)
Texas horned lizard (*Phrynosoma cornutum)*
Texas largeseed bittercress (*Cardamine macrocarpa* var*. texana)*
Texas madrone *(Arbutus xalapensis [texana])*
Texas persimmon (*Diospyros texana*)
Texas purple spike (*Hexalectris warnockii)*
Three-awns (*Aristida* spp.)
Three-tongued spurge (*Chamaesyce chaetocalyx* var*. triligulata)*
Tobosagrass *(Hilaria mutica)*
Trans-Pecos maidenbush (*Andrachne arida)*
Trans-Pecos rat snake (*Bogertophis subocularis*)
Turkey vulture *(Cathartes aura)*
Two-Bristle rock daisy (*Perityle bisetosa* var*. bisetosa)*
Variable oakleaf caterpillar (*Lochmaeus manteo*)
Weeping juniper (*Juniperus flaccidus)*
Western diamondback rattlesnake (*Crotalus atrox*)
Western pipistrelle (*Pipistrellus Hesperus*)
White column cactus (*Escobaria albicolumnaria*)
Willow, Goodding (*Salix gooddingii*), Black *(S. nigra)*, Coyote *(S. exigua)*
Wright silktassel (*Garrya wrightii)*
Yellow bells (*Tacoma stans*)
Yellow-billed cuckoo (*Coccyzus americanus*)
Yellow-breasted chat (*Icteria virens auricollis*)
Yellow-nosed cotton rat (*Sigmodon ochrognathus*)
Yucca (6 *Yucca* spp.)

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Appendix D: NEPA and NHPA COMPLIANCE

(Insert CD he

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Appendix E-1A 2005 Wildland Fire Call out list, June 30, 2005

Initial callout will be made to Fire Management Staff

Fire Staff		**Work Phone**	**Home Phone**
John Morlock	(460)	477-2397	477-2381
Gary Luce	(462)	477-2554	477-2468
Joe Roberts	(463)	477-2554	386- 4346 (Marathon)
Chris Wood	(465)	477-2554	477-2338
Reine Wonite	(467)	477-2554	477-2595
Jeremiah Marsh	(466)	477-2554	477-2338
John Zubia	(471)	477-2509	Try LE Emory
Richard Gatewood	(470)	770-8785(Alpine)	837-1456
Nicola Stringer	(472)	477-2510	477-2338
Jess Erickson	(473)	477-2510	477-2468
Heather Dammeyer	(474)	477-2510	477-2690

Park Staff		
Aaron Scott	477-2225	477-2384
Amy Davis	477-1187	477-2412
Brian Sikes	477-2225	477-2261
Dan Leavitt	477-1185	477-2564
Dan Muntean	477-1133	477-2345
David Elkowitz	477-1107	477-2595
David Van Inwagen	477-2597	477-2521
David Yim	477-2392	477-2447
Don Corrick	477-1142	477-2306
Don Sharlow	477-1124	477-2395
Eric Leonard	477-1196	477-2621
Joe Sirotnak	477-1148	477-2028
Nathan Dammeyer	477-1148	477-2690
John Lowe	477-1131	477-2553
Ron Sams	477-2392	477-2689
Laura Van Inwagen	477-1180	477-2521
Mark Spier	477-1185	477-2463
Mark Spurlock	477-2264	
Mark Yuhas	477-1133	477-2389
Jeff Sartain	477-2288	477-2526
Mike Ryan	477-1137	477-2330
Monica Foster	477-1187	477-2323
Nick Herring	477-1138	477-2226
Radford Dew	477 1138	
Raymond Skiles	477-1145	477-2232
Jeff Bennett	477-1141	477-2657
Scott Jacobs	477-2356	477-2323

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Steve Benavidez	477-1128	477-2406
Tom Alex	477-1144	477-2254

BOLD LETTERS INDICATES THEY ARE NOT TO BE ASSIGNED A FIRELINE POSITION. Reference Appendix E-1a for other qualifications.

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Appendix E-1b **2005 Wildland Firefighters**

Qualifications List (March 24, 2005)

Fire Staff

John Morlock	(460)	CREP, DIVS, ENGB, FIRB.FOBS, ICT3, SITL, TFLD,RXB2,EMTB
Gary Luce	(462)	CRWB,ENGB, FALB, RXI2, ICT4-T, FEMO-T, HECM-T
Joe Roberts	(463)	FFT1, ENOP, CRWB-T, ENGB-T, HECM-T
Chris Wood	(465)	FFT2, FFT1-T, HECM-T
Jeremiah Marsh	(466)	FFT2, HECM, EMT
John Zubia	(471)	CRWB, ENGB, ICT4, FIRB, HECM, HCWN, RXI2, FOBS
Richard Gatewood	(470)	FFT1-T, FALB, FEMO
Lori Bush	(461)	Dispatch, Expanded Dispatch

Park Staff

Don Corrick	HECM, FFT2, Archeologist Resource Advisor, Geologist
Tom Alex	FFT2, Archeologist Resource Advisor
David Elkowitz	FFT1, FEMO, PIO2, FOBS-T
John Lowe	HECM, HCWN-T
Don Sharlow	HCWN, HEMG-T, FALC
Mark Spier	FFT1, CRWB, ICT4, ICT3, EMT
Amy Davis	IADP, FFT2, Expanded Dispatch
Mike Ryan	FFT1, FFT2, HECM??need to confirm..
Mark Spurlock	Equipment MGR-T

Park Staff and Trail Crew all FFT2	**Work**	**Home**
Aaron Scott	477-2225	477-2384
Brian Sikes	477-2225	477-2261
Dan Leavitt	477-1185	477-2564
Dan Muntean	477-1133	477-2345
David VanInwagen	477-2597	477-2521
David Yim	477-2392	477-2447
Eric Leonard	477-1196	
Jake Szympruch	477-2356	477-2444
Jessica Erickson	477-1187	477-2468
Joe Sirotnak	477-1148	477-2028
Kyle Green	477-1118	477-2228
Laura VanInwagen	477-1180	477-2521
Mark Yuhas	477-1133	477-2389
Meghan Hicks	477-1187	477-2419
Monica Foster	477-1187	477-2323
Nick Herring	477-1138	477-2226
Raymond Skiles	477-1145	477-2232
Scott Jacobs	477-2356	477-2323

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Steve Benevides	477-1128	477-2406
Whitt Hibbard	477-2225	

Trail Crew FFT2 and some HECM-T

Erik Walker (work leader)	477-2338	Cell—513 255 1270
Maria Lavender	477-2338	Cell—513 255 1270
Mark Kneeskern	477-2338	
Danica Celix	477-2338	
Barry Lockwood	477-2338	

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Appendix E-2 Cooperative Agreements

A44 (BIBE) Agreement Number G7130020001

GENERAL AGREEMENT
BETWEEN
BIG BEND NATIONAL PARK
RIO GRANDE WILD AND SCENIC RIVER
AND
BREWSTER COUNTY, TEXAS
FOR
EMERGENCY SERVICES

Article I - Background And Objectives

This agreement is entered into by and between the National Park Service (hereinafter NPS), United States Department of the Interior, acting through the Superintendent of Big Bend National Park (hereinafter Park), and Brewster County (hereinafter County), acting through its County Judge. The purpose of this agreement is to establish the terms and conditions under which the parties will provide mutual emergency assistance for occurrences of structural fires, vehicle fires, wildland fires, medical services, hazardous materials spills, and search and rescue operations on lands within the Park's boundaries and in the near-by surrounding County area.

Article II - Legislative Authority

This agreement is entered into under the authority of 42 U.S.C. § 1856a (2000), and 16 U.S.C. §§ 1-3.

Article III - Statement of Work

A. The NPS agrees to:

1. Furnish, when requested by the County, available, qualified personnel and equipment to assist with emergency occurrences of structural fires, vehicle fires, wildland fires, medical services, hazardous materials spills, and search and rescue operations within the surrounding area outside the Park boundary. Qualified NPS employees authorized by a supervisor to respond shall be deemed to be on-duty and acting within the scope of their federal employment when responding to calls outside the Park.

2. Provide, as requested, to the County, familiarization tours of the Park's facilities, equipment, and access points.

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B. The COUNTY agrees to:

1. Furnish, when requested by the Park, available, qualified personnel and equipment to assist with emergency occurrences of structural fires, vehicle fires, wildland fires, medical services, hazardous materials spills, and search and rescue operations on federally owned land within the Park.

2. Provide, as requested, to the Park, familiarization tours of the County's facilities and equipment.

C. The parties further agree as follows:

1. The County and the NPS each acknowledge and agree that the County is not the employer of the personnel who provide fire fighting and emergency medical services within the County. It is agreed and understood that other nonprofit or for profit agencies are the employers of these categories of emergency responders who are working in Brewster County, and as such, the County exercises no direct control or supervision over firefighters and emergency medical service personnel. However, Brewster County agrees that it will use its best efforts to secure the cooperation of the nonprofit and for profit agencies and the employees of these agencies in abiding by the terms of this agreement.

2. Each party shall provide to the other a list of responsible persons, with telephone numbers, to be contacted in an emergency. At least once a year, or more often if necessary, each party shall provide the other party with an updated list of such persons and telephone numbers.

3. Each party shall provide to the other copies of current applicable emergency operations plans for their areas of primary responsibility, including maps of areas involved and descriptions of special or extraordinary actions to be taken.

4. Each party to this agreement waives all claims against the other for compensation for any loss, damage, personal injury, or death occurring inconsequence of the performance of this agreement.

5. Neither party to this agreement shall reimburse the other for any or all costs incurred by such- party in providing services pursuant to this agreement.

6. Nothing contained herein shall be construed as limiting in any way the responsibility and authority as defined by law, of the Superintendent, Big Bend National Park and the County Judge, Brewster County, in connection with the management and protection of lands and resources under their respective administrative jurisdictions.

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7. Nothing contained herein shall be construed as limiting in any way the responsibility and authority of each party’s personnel to carry-out their responsibilities in accordance with their employing party's policy and training.

8. It is agreed that each party will be solely responsible for the acts and omissions of its ! officers, employees, and volunteers, to the same extent as each party is presently responsible under applicable laws and regulations.

9. During an emergency, the highest ranking representative of the party with administrative jurisdiction over the area in which the emergency occurs, or his/her designee, will be the Incident Commander and will be responsible for the direction of the emergency response efforts, unless the emergency is first reached by representatives of the other party, in which case they will assume the responsibility of Incident Command. When a representative of the party with administrative jurisdiction over the area arrives, the Incident Commander will relinquish the duties of Incident Commander to the representative of the agency with administrative jurisdiction, and will cooperate with that representative in the ongoing emergency response efforts.

10. The highest ranking representative of each party who is present at the scene will supervise that party's employees and will control the method and manner of its employees' work. Nothing in this agreement is intended to alter the parties' usual chain of command. The Incident Commander will communicate only with the highest ranking representative of the other party who is present at the scene. For good cause the hig4est ranking representative of either party may decide at any time to withdraw emergency assistance.

11. NPS employees rendering emergency assistance to Brewster County under this agreement shall wear the official NPS or park approved uniform and personal protective equipment; shall be subject to the laws and policies of the NPS and of the United States; and may not accept compensation from any source other than the NPS.

12. After notifying the other party of an emergency and receiving a request for assistance, either party may take immediate action to suppress or mitigate the emergency in the other party's area of primary responsibility in order to save life or property.

13. Neither party shall jeopardize the security of their area by over-committing available personnel and equipment to an ongoing emergency in the territory of the other party. The amount of resources to be committed will be determined solely by the responsible authority of each party.

14. The parties. shall make available and share their respective emergency radio frequencies for both monitoring and transmission, and provide radio dispatch services as requested.

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15. As mutual training and equipment familiarization will be of great benefit during any emergency, each party agrees to notify the other of available training and participate in joint training exercises when possible.

Article IV - Term of Agreement

This agreement shall be effective for a period of five years from the date of final signature, unless it is terminated earlier by one of the parties pursuant to article IX that follows. At the conclusion of that five-year term, this agreement may be extended or renewed by written agreement of the parties.

Article V - Key Officials

All communications and notices regarding this agreement shall be directed to the following key official(s) for each party:

For the NPS:
Superintendent
Big Bend National Park
P.O. Box 129
Big Bend, Texas 79834
(915) 477-1101

For Brewster County:
Brewster County Judge
P.O. Box 1630
Alpine, Texas 79830
(915) 837-2412

Article VI - Prior Approval

Not applicable.

Article VII - Reports and/or Other Deliverables

Upon request and to the full extent permitted by applicable law, the parties shall share with each other final reports of incidents involving both parties.

Article VIII - Property Utilization

Unless otherwise agreed to in writing by the parties, any property furnished by one party to the other shall remain the property of the furnishing party. Any property furnished by the Park to the County during the performance of this agreement shall be used and disposed of as set forth in NPS Property Management Regulations.

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Article IX - Modification and Termination of Agreement

This agreement may be modified only by a written instrument executed by the parties. Either party may terminate this agreement by providing the other party with sixty (60) days 'advance written notice.

Article X - Standard Clauses

A. Civil Rights

During the performance of this Agreement, the participants agree *to* abide by the terms *of* U.S. Department of the Interior - Civil Rights Assurance Certification, nondiscrimination and will *not* discriminate against any person because of race, color, religion, sex, or national origin. The participants will take affirmative action *to* ensure that applicants are employed without regard *to* their race, color, sexual orientation, national origin, disabilities, religion, age, or sex.

B. Public Information Release

Each party will obtain prior approval from the Key Official of the other party for any public information releases which refer *to* either the County, or the Department of the Interior (including any bureau and park unit), or employees (by nan1e or title), or this Agreement. The specific text, layout, photographs, etc. of the proposed release must be submitted with the request for approval.

Article XI - Authorizing Signatures

In witness hereof, the following authorized representatives of the parties have signed their names on the date(s) indicated, thereby executing this agreement.

For Brewster County:

Signed by Val Beard	July 23, 2002
Val Beard, County Judge	Date

For the National Park Service:

Signed by Frank J. Deckert	July 18, 2002
Frank J. Deckert, Superintendent	Date

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INTERPARK AGREEMENT
between
Big Bend National Park
and
Amistad National Recreation Area, Fort Davis National Historic Site
And Palo Alto Battlefield National Historic Site

ARTICLE I. PURPOSE

Define the mutual responsibilities of the Big Bend National Park Wildland Fire Management Staff and staff from Amistad National Recreation Area, Fort Davis National Historic Site, and Palo Alto Battlefield National Historic Site in terms of Wildland Fire Management activities.

ARTICLE II. RESPONSIBILITIES

The duties of the Big Bend National Park Wildland Fire Management Staff will include providing, as requested and required, professional and technical support for the Wildland Fire Management programs to units identified in Article I. The performance of these responsibilities will be based on an annual work plan developed by and coordinated with the National Park Service (NPS) Unit Superintendents, Fire Management Officer, and other staff as appropriate.

A. Specific responsibilities of the Fire Management Staff include:

1. Assists in development and implementation of prevention, suppression, fuels management and rehabilitation programs with appropriate staff through site visits, program reviews, inspections, budget formulation, and training.

2. Assists in coordination of reports, correspondence, preparation/review of fire management plans and participate in fire management planning as requested.

3. Assists in coordination and implementation of planned ignitions, fire effects, smoke management, fire ecology, and research programs according to park and area fire management plans.

4. Coordinates, through appropriate zone coordination centers, mobilization of National Park Service personnel for fire assignments.

5. Develops, coordinates, and conducts fire- related training as necessary to meet wildland fire needs of the units and interagency needs according to approved fire management plans, zone, field area, cluster, and national guidelines. Assists Intermountain Regional Fire Management Staff in the identification, issuance of performance task books, and certification of individuals for development of overhead positions.

6. Manage fire qualification/training records in the National Park Service Wildland Fire Computer System, including: initial record input; updating fitness scores, training, record transfer, experience, and instructor records, and issues

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incident qualification cards. Big Bend will provide an annual timetable to each unit fire coordinator.

7. Communicates with respective units on issues and concerns prior to representing the SW Texas Park units at meetings, conferences, seminars, and other functions as requested and required, including the Interagency Fire Program Analysis (FPA).

8. Coordinates NPS role in the 'local' or 'zone' interagency fire community; developing interagency agreements, cooperative agreements, and other agreements necessary for carrying out wildland fire management.

B: Responsibilities of the Superintendents include:

1. Request assistance through the Fire Management Office with sufficient lead time to meet due dates, set- up meetings, etc. Each NPS Unit Superintendent will designate a Unit Fire Coordinator who requests program assistance, budget, supplies, and training needs through the Big Bend Fire Management Officer.

2. Submit personnel file updates, physical fitness scores, individual fire reports (DI- 1202), situation reports, physical exam records, and ROSS (availability) information following established times and due dates. Unit Fire Coordinators will be responsible for maintaining fire readiness to the level identified in the Park's Fire Management Plan, or if no Fire Management Plan exists, to the level agreed to by the Unit Superintendent and Fire Management Officer.

3. Notify the Big Bend Fire Management Officer as soon as practical of any fire restrictions, closures, fire occurrences, or support actions.

4. Participate in the overall Wildland Fire Management of the SW Texas Park units and of the NPS by committing to sharing of trained and available personnel upon request.

INTERPARK COORDINATION

1. The Fire Management Officer will meet with each Superintendent and/or unit fire coordinator annually to prepare a work plan for each unit. The work plan will be distributed to each unit not later than 30 January each year.

ARTICLE IV. FUNDING

1. Program costs (travel/per diem, communications, supplies & materials, etc.) incurred by the Big Bend Fire Staff will be charged to appropriate FIREPRO or FPA accounts. If personnel are working on a project which has been individually funded, the personnel may be paid from appropriate project funds.

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2. Annual budgets will be developed, identifying supplemental support for park units - i.e.: physical exams, PPE, training, cache items, travel, hazard fuel reduction projects, etc., this budget request will be reflected in the FIREPRO or FPA Park's annual budget request. The budget submission will be completed not later than 30 June each year.

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ARTICLE V. TERM OF AGREEMENT

The term of this Agreement will be five (5) years, beginning in fiscal year 2005. It is renewable at the end of each five- year period by written letter of agreement signed by each of the Superintendents of the SW Texas Park units.

Amendments to this Agreement can be made at any time subject to the written concurrence and approval of all Superintendents. This Agreement may be cancelled with written notification at any time by a park superintendent. The Agreement will remain in effect for the remaining parks.

ARTICLE VI. REPORTS

The Big Bend Fire Staff will supply trip reports (within 2 weeks), situation reports, and personnel file information, or other pertinent reports to each area, as requested.

ARTICLE VII. SIGNATURES

IN WITNESS HEREOF, the parties hereto have executed this Agreement on the date(s) set forth below.

Signature: _____

Name: Myrna Palfrey- Perez_____

Title: Superintendent_____

Palo Alto Battlefield National Historic Site

Date: _____

Signature: _____

Name: Alan Cox_____

Title: Superintendent_____

Amistad National Recreation Area

Date: _____

Signature: _____

Name: John H. King_____

Title: Superintendent_____

Big Bend National Park

Date: _____

Signature: _____

Name: Todd Brindle_____

Title: Superintendent_____

Fort Davis National Historic Site

Date: _____

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JOINT POWERS OPERATING PLAN

LINCOLN UNIT

AGE. NO. 16-R3-77-0003
NO. CANMSO 90

NO. 66-4

_____ _____
Forest Supervisor, Date
Lincoln National Forest

_____ _____
Capitan District Forester, Date
State of New Mexico, Forestry Division

_____ _____
Roswell Field Office Manager, Date
Bureau of Land Management

_____ _____
Las Cruces Field Office Manager, Date
Bureau of Land Management

_____ _____
Carlsbad Field Office Manager, Date
Bureau of Land Management

_____ _____
Mescalero Agency Superintendent, Date
Bureau of Indian Affairs

_____ _____
Superintendent, **Carlsbad Caverns National Park** Date

_____ _____
Superintendent, Date
Guadalupe Mountains National Park

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Superintendent, **Ft. Davis National Historic Site**	Date
Superintendent, **Big Bend National Park**	Date
Superintendent, **White Sands National Monument**	Date
Superintendent, **Chamizal National Monument**	Date
Refuge Manager, **Bitter Lake National Wildlife Refuge**	Date
Hatchery Manager, **Dexter National Fish Hatchery**	Date
Refuge Manager, **San Andreas National Wildlife Refuge**	Date

JOINT POWERS OPERATING PLAN

This Operating Plan is between the United States Department of the Interior, National Park Service (NPS), Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), Fish and Wildlife Service (F&WS), the United States Department of Agriculture, Forest Service (USFS); and the State of New Mexico - Energy, Minerals and Natural Resources Department, Forestry Division (NMFD).

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I. **Authority**

The authority for Federal agencies or organizations is as follows:

> *USDA, Forest Service - Section 5, Act of April 24, 1950 (16 USC 572); the Act of June 30, 1914 (16 USC 498) and the Act of September 21, 1944 (16 USC 580); the Act of December 12, 1975 (16 USC 565a-1-3) and the Annual Department of Interior and Related Agencies Appropriations Act.*
>
> *USDI, Bureau of Land Management - 42 Statute 857, (16 USC 594, 48 Statute 1270; 43 USC 315a, 90 Statute 2766, 43 USC 1737.*
>
> *USDI, National Park Service - 16 USC 1b (1).*
>
> *USDI, Bureau of Indian Affairs - 42 Statute 857; 16 USC 594; 69 Statute 66; Section 16 of Order 2503 (Secretary of the Interior).*
>
> *USDI, Fish and Wildlife Service - 42 Statute 857; 16 USC 594.*
>
> Authority applicable to all Federal agencies - *Reciprocal Fire Protection Act of 1955 (42 USC 1856); and the Economy Act of June 30, 1932 (31 USC 686).*

The authority for the New Mexico Forestry Division is as follows:

> *Sections 68-2-6 and 68-2-8 of the New Mexico Forest Conservation Act, NMSA 1978 Compilation.*

Authority for this Operating Plan is derived from and part of the Joint Powers Agreement among the Energy, Minerals and Natural Resources Department and the United States Federal Agencies of the Department of Agriculture, Department of Interior with Wildland Fire Protection Responsibilities, Section 10, General Provisions, Item h, between the above mentioned Federal and State agencies, which call for the preparation and adoption of an annual operating plan.

II. **PURPOSE**

The purpose of the Operating Plan is to establish an agreement for wildland fire management and to provide initial attack procedures for the Lincoln Zone.

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III. **MANAGEMENT BOARD**

It is agreed that the following Management Board will be established to coordinate activities within the Zone:

A. Type II and Type III Interagency Incident Management Team Board

1. Membership - This board will be made up of one (1) member from each of the following agencies:

   a. USDA Forest Service
   b. USDI Bureau of Indian Affairs
   c. USDI Bureau of Land Management
   d. USDI National Park Service
   e. State of New Mexico EMNRD - Forestry Division
   f. US Fish and Wildlife Service

Note: LNZ Coordination Center Rep. is not a voting member of board.

2. Duties -

   The duties of this Management Board will include:

   a. Participation in the selection of the New Mexico Type II and the local zone Type III Interagency Incident Management Team members;
   b. Evaluate training needs for the Incident Management Team positions and make recommendations for training courses to the Lincoln Zone Interagency Coordination Center Management Board.

B. Lincoln Zone Interagency Coordination Center Management Board

1. This board will be made up of one (1) member from each of the following agencies:

   a. USDA Forest Service;
   b. USDI Bureau of Indian Affairs;
   c. USDI Bureau of Land Management;
   d. USDI National Park Service;
   e. State of New Mexico EMNRD – Forestry Division;
   f. US Fish and Wildlife Service.

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2. Duties –

The duties of this board will include:

a. See *Appendix LZCC Management Board Charter – Exhibit VI.*

IV. **RESPONSIBILITY**

It is mutually agreed that each party of this Operating Plan will retain ultimate responsibility for all fire management action on lands under its administrative jurisdiction.

V. **DEFINITIONS**

1. *Initial Attack* is that initial suppression response to a wildland fire incident;
2. *Escaped Fire* is a fire that exceeds the capabilities of the initial response forces;
3. *Reinforcements* shall mean all forces subsequent to initial attack;
4. *Initial Attack Incident Commander* is the first fire qualified supervisory person to arrive at the fire, until relieved;
5. *Jurisdictional Agency* is that agency having ultimate responsibility for fire management action on lands under its jurisdiction;
6. *Initial Attack Zones* are mutually agreed upon areas delineating initial attack responsibilities;
7. *Notification of Initial Attack Action* (See *Exhibit II*).

VI. **DESIGNATED ZONES OF RESPONSIBILITY**

1. Initial attack zones have been established based on closest and available fire protection resources and capabilities of the designated responding agency. A map of these zones is attached hereto and made a part of this Operating Plan (*Exhibit I*).

2. The designated initial attack zones are based on historical wildfire incidents and are agreed to be off-setting for Federal and non-Federal expenditures of funds, and, thereby mutually beneficial and cost-effective. It is also agreed that Federal protection cost on non-Federal lands will not exceed the protection by the State. Conversely, the State will not expend funds to a greater extent in protecting Federal lands.

3. <u>The agency responsible for initial attack should make a reasonable effort to contact private landowners in advance of fire season.</u> The objective of such contacts is to briefly explain the initial attack responsibilities and obtain gate keys or permission by the landowner to cut fences or gates

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for access to fires. Any damage to private lands for access should be restored following control of the fire. These contacts should be made by local unit personnel who have the assigned initial attack responsibility.

VII. **SPECIFIC PROVISIONS**

1. Initial Attack Fires -

A. Communication:

a. Each agency will submit an initial report through the Lincoln Zone coordination Center to cooperating agencies of their available resources by April 1st of each year. Refer to the procedures in the Lincoln Zone Operating Plan.

b. Prompt verbal notification will be given to the jurisdictional agency that initial action has been taken. (See *Exhibit II*).

c. A Fire Situation Report must be submitted daily to LZCC and a copy to the jurisdictional agency.

d. Radio frequency authorization (See *Exhibit V*).

B. Coordination:

a. The initial attack agency shall abide by the jurisdictional agency's procedures in dealing with ownerships involved.

b. The initial attack agency shall submit its Fire Report to the jurisdictional agency within fourteen (14) days after the fire is declared out.

c. The initial attack agency will continue dispatching services on fires for which initial attack actions are being taken.

d. The agencies may jointly conduct mutual interest projects, within their authority, to maintain or improve the fire management capability of the agencies. Such projects will be conducted through specially developed agreements.

C. Payment:

The initial attack agency will bear the initial attack cost unless otherwise negotiated.

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D. Critical Zone Needs:

The activation of a Multiple Agency Coordination (MAC) Group for extenuating fire needs of the Zone will be at the discretion of the MAC Group Board Members or delegates.

2. Escaped Initial Attack Fire

A. Communication:

a. The initial attack agency shall notify LZCC when the fire has escaped initial attack.

b. The time of escape, date, from whom and to whom the report is made must be documented by the dispatcher and reported immediately to the jurisdictional agency. (See *Exhibit III*).

B. Coordination:

a. Jurisdictional agency will initiate management action as necessary to suppress the fire and assume management of the fire as soon as the designated agency representative arrives at the fire.

b. The jurisdictional agency may request the initial attack agency to retain control of the fire. When agreement is reached, documentation will be made.

c. The initial attack agency shall submit an estimate of reimbursable suppression cost to the State within two (2) weeks from the time the service was rendered (See *Exhibit IV*).

(1) Final bill will be submitted within one hundred-twenty (120) days from the time of the service.

VIII. **GENERAL PROVISIONS**

A. Fire Out Policy -

As a minimum, on an initial attack fire, a fire will not be abandoned until at least one (1) hour has passed since the last hot spot was check extinguished. A check of the fire will be made within twenty-four (24)

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hours after it was abandoned to check for hot spots. If no hot spots are found, the fire will be declared out.

B. Mop Up/Abandonment Checks -

The initial attack agency will be responsible for mop up and abandonment checks, unless otherwise negotiated. Mop up and abandonment checks for escaped fires will be determined by the jurisdictional agency.

C. News Releases -

Involved agencies will coordinate news release items pertaining to the current fire situation to the media. Jurisdictional agency will be responsible for news releases on fire specific to their agency.

D. Fire Statistics (Fire Report/Records, etc.) -

The jurisdictional agency has the responsibility of preparing their statistical fire report. Information for this report shall be provided by the responding agency.

E. Effective Date -

This plan is effective when all parties have signed and dated.

F. Review/Revisions -

1. This Operating Plan will be reviewed annually by representatives of each participating agency before March 15th of each year. The plan shall remain valid for three to five years unless major changes in policy or direction render then plan invalid prior to the expiration of that period. The current plan should be revised prior to the 2007 fire season.

2. This Operating Plan will remain in effect among all the signing parties until one (1) or more of the parties submits a written Notice of Withdrawal from the Operating Plan which would affect the other parties signing. Interim modifications of this plan may be made subject to agreement by parties concerned to correct unworkable situations.

3. Changes in initial attack responsibility areas will be made as attachments to this Operating Plan and will be signed only by those parties involved in those changes. Amendments will be

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submitted to the State Forestry Division to be placed in the Joint Powers Operating Plan master file.

4. Copies of the master Joint Powers Operating Plans and maps of initial attack zones will be maintained by the State Forestry Division.

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Appendix F: Wildland and Prescribed Fire Monitoring Plan

Wildland and Prescribed Fire Monitoring Plan

Big Bend National Park

Submitted by:_____ Date_____
Fire Effects Module Supervisor

Reviewed by:_____ Date_____
Fire Management Officer

Approved by:_____ Date_____
Regional Fire Ecologist

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Introduction:

Big Bend lies in the middle of the Chihuahuan Desert. More than ninety percent of the park is desert. High elevation canyons and bajadas of the mountains, ephemerally filled arroyos and depressions, expanses of lowland deserts, and permanent waters of the Rio Grande support 1200 plant species within the park. Diversity is further shaped by limestone and igneous soils, extremes in rainfall from 4 inches in the low desert to above 16 inches in the Chisos, and temperatures ranging from 100° F to freezing. Although precipitation is highly variable from year to year there are extended periods when the trend is increasing wet and periods when the trend is increasingly dry (Figure 1).

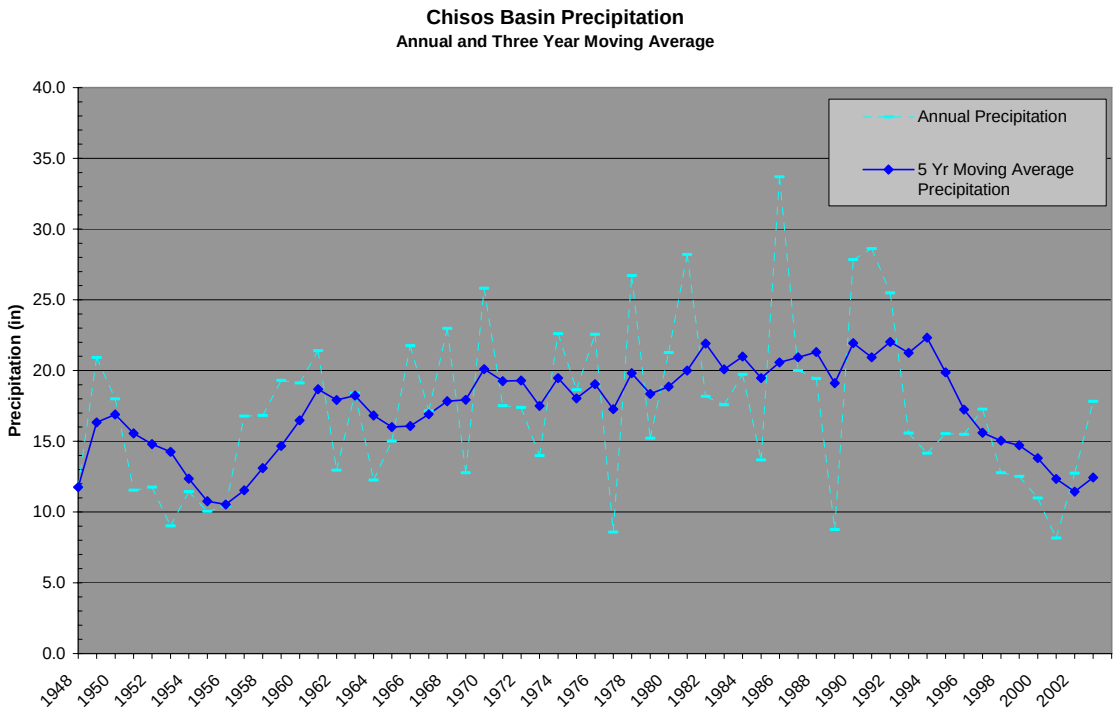

Figure 0–1 Three year moving average (solid line) of precipitation and annual precipitation (dashed line) for the Chisos Basin at Big Bend National Park, TX

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The following paragraphs are brief descriptions of the vegetation categories:

Floodplain/Upland Riparian

Two cover-mapping categories, Mixed Riparian and Desert Willow from Plumb (1992) form this vegetation category. The Rio Grande with a high water table and dependable water all year round supports considerable stands of vegetation, and although just 3% of the park's area, this habitat forms a vital lifeline for animals and humans.

Common species: Big Bend cottonwood, honey mesquite, screwbean, willow, desert willow, acacia, common reed; exotics include saltcedar, giant reed, Bermuda grass and buffelgrass.

Scrub Desert:

This vegetation category was compiled from five cover-mapping categories from Plumb (1992); Creosote-Lechuguilla-Grass, Creosote-Lechuguilla-Prickly Pear, Creosote-Tarbush, Creosote-Yucca- Grass, and Lechuguilla-Candelillia-Hechtia. Desert scrub is dominated by shrubs (creosote, mariola and ocotillo) and succulents (prickly pear, lechuguilla, and Texas hetchia or false agave). Grasses are subdominant and provide insufficient fuels to carry fire. Scrub Desert occurs over half the park between the low-lying floodplains at 1,700 ft to mid-elevation desert grasslands at 3,000 ft. Average annual precipitation of 8-12 inches falls in winter and summer (mostly) with high rates of evaporation.

Common Species: Creosote, tarbush, lechuguilla, mariola, prickly pear, candelilla, hetchia, tobosa grass, sacaton, chino grama.

High Desert Grasslands:

This is the most diverse vegetation category in the park. High desert grasslands cover about 40 percent of the park ranging from 3,000 to 5,000 ft in elevation. Annual rainfall is 10-16 inches with most in summer. The grasslands contain some shrubs, low-growing trees and cacti.

Common Species: Lechuguilla, prickly-pear, bear-grass, sotol, viguiera, yucca, skeletonleaf golden-eye, ceniza, acacia, Dalea spp., grama grasses (Chino, blue, black, hairy and sideoats), tanglehead, lovegrass, California cottontop, green spangletop and threeawn, tobosa grass and alkali sacaton.

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Shrub Woodland:

This vegetation category contains three cover-mapping categories from Plumb (1992). These are Mixed Scrub, Oak Scrub and Mixed Oak-Shrub Woodlands. This category includes many different shrub dominated communities scattered in the foothills and mountains of the Chisos Mountains and Dead Horse Mountains. Elevation is from 4,500 ft at Green Gulch to 5,500 ft near the Chisos Basin. Annual precipitation averages 12 to 16 inches.

Common species: Low growth Gray and Emory oak, catclaw acacia, catclaw mimosa, aloysia, slimleaf vauquelinia, Evergreen sumac, Shorthorn jefea, and low-growth redberry and alligator junipers.

Grassy Woodlands

Grassy Woodlands contain three cover-mapping categories from Plumb (1992). These are Pinyon- Juniper-Grass, Pinyon-Oak-Juniper, and Forest-Meadow. These categories are found approximately 5,500 ft to 7,200 ft with more than 16 inches annual rainfall.

Common species: Mexican pinyon, redberry juniper, weeping juniper, alligator juniper, gray oak, Graves and Emory oaks. Understory species of Salvia spp., Harvard agave, silk-tassel garrya, bull muhly, pinyon rice-grass.

Forest

The Forest category contains two cover-mapping categories from Plumb (1992). These are Pinyon-Talus and Oak-Ponderosa Pine-Cypress. Forest occurs above 6,000 ft with annual precipitation above 16 inches and forms a mosaic of conifers and grassy woodlands with various other species.

Common species: Mexican pinyon, Graves oak, redberry, weeping and alligator junipers.

Unique Habitats

Six habitats are determined as unique within the park. These are mountain meadows, Chisos grasslands, upland springs, limestone habitat, dunes, and Chisos woodlands and forest.

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Management Objectives:

The fire ecology program at Big Bend National Park will tailor the fire effects monitoring program to provide pertinent information for adaptive fire management of vegetation. Research burns, by definition, will have a research component, that will include replicated treatments (a minimum of 3 treatment replications) that serve as either "controls" (untreated plots) and plots that receive the experimental treatment of prescribed fire, wildland fire use or mechanical thinning, herbicide application or some combination of treatments (i.e. burning + herbicide). Monitoring will also be conducted on fuels projects that are not designated as research to provide feedback as to whether or not natural, cultural or fire management objectives are being met and provide additional information to adaptively manage both wildland fire use and prescribed fire.

A reasonable attempt will be made to address each of the following Fire ecology research questions in each prescribed fire opportunity (1) effects of fire on plant community composition, (2) effects of fire on rare or sensitive plant and animal species, (3) soil movement in response to fire, (4) effects of fire on fuel loading, ladder fuels, and fuel size class distribution, and (5) forest stand age and size class structure.

Big Bend NP is divided into three fire management units, respectfully, FMU1, FMU2, and FMU3. A Fire Management Unit (FMU) identify an area of the Park that is assigned different fire management objectives and strategies based on management constraints, fire regime, and the human, natural, and cultural resource values to be protected. FMU 1, designated as the Suppression Unit , contains approximately 188,200 acres and includes developments, utility corridors, fire-susceptible cultural resource sites, legally protected species and habitat, private in-holdings and a variable-width suppression buffer along park boundaries. The strategy for managing fire in FMU #1 is to suppress all fires using methods necessary to confine, contain, or control. FMU #2, the Wildland Fire Use Unit, is that portion of the park lands that **does not** include developments, utility corridors, fire-susceptible cultural resource sites, legally protected species and habitat, private in-holdings and a variable-width suppression buffer along park boundaries. FMU 3 is the Chisos Mountains. The Chisos Mountains, designated as a Special Treatment Unit contains approximately 39,000 acres. Wildland Use Fires may be allowed within prescription depending on site, or suppressed until research results indicate likely outcomes. These proposed research fires are aimed at supporting science-based management in the park. Fire effects will be monitored with respect to sensitive species and habitats, at differing intensities, and in different seasons.

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Monitoring Design:

National Park Service Wildland Fire Management policy (NPS 1998) directs managers to monitor all prescribed and wildland fires. Fire effects monitoring must be done to evaluate the degree to which objectives are accomplished. Long-term monitoring is required to document that overall programmatic objectives are being met and undesired effects are not occurring. Evaluation of fire effects data are the joint responsibility of fire management and natural resource management personnel.

Monitoring plots are planned for all six vegetation categories to establish baseline information on species, vegetation structure, cover and height. These plots augment research begun in the late 1970s and early 1980s to develop databases that indicate fire effects over the long-term. The need for a research and monitoring program was noted in the 1994 FMP (p. 80-81). Post-burn information allows comparisons with earlier surveys, refinement of current prescriptions, and eventually may provide information for prescriptive fire plans. Post -fire monitoring is proposed for prescribed burns where such data will assist park resource objectives.

Fire monitoring within Big Bend National Park follows the recommended standards described in the Fire Monitoring Handbook (NPS 2003). These standards are based on four levels of monitoring:

• Level 1: Environmental. This level provides a basic overview of the baseline data that can be collected prior to a burn event. Information at this level includes historical data such as weather, socio-political factors, terrain, and other factors useful in a fire management program. Some of these data are collected infrequently (e.g., terrain); other data (e.g., weather) are collected regularly.

• Level 2: Fire Observation Documentation. Monitoring fire conditions calls for data to be collected on ambient conditions as well as on fire and smoke characteristics. These data are coupled with information gathered during environmental monitoring to predict fire behavior and identify potential problems.

• Level 3: Short-term Change Monitoring. Short-term change (level 3) is required for all prescribed fires. Monitoring at this level provides information on fuel reduction and vegetative change within a specific vegetation and fuel complex (monitoring type), as well as on other variables, according to your management objectives. These data allow you to make a quantitative evaluation of whether a stated management objective was met. Vegetation and fuels monitoring data are collected primarily through sampling of

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permanent monitoring plots. Monitoring is carried out at varying frequencies— pre-burn,
during the burn, and immediately post-burn; this continues for up to two years post-burn.

• Level 4: Long-term Change. Long-term change (level 4) monitoring is also required for prescribed fires, and often includes monitoring of short-term change (level 3) variables sampled at the same permanent monitoring plots over a longer period. This level of monitoring is also concerned with identification of significant trends that can guide management decisions. Some trends may be useful even if they do not have a high level of certainty. Monitoring frequency is based on a sequence of sampling at some defined interval (often after five, then ten years, then every ten years) past the year-two postburn monitoring. This long-term change monitoring continues until the area is again treated with fire.

At Big Bend National Park environmental monitoring (level 1) is required for all fire management activities and most of this monitoring is on-going and not tied to a specific fire incident. Environmental monitoring provides the basic background information needed for decision-making. The following types of environmental data are collected: weather, fire danger rating, fuel conditions, and values to be protected. Data collection related to weather, fire danger rating, and fuel conditions has already been described in this document. Data specific to values to be protected is collected opportunistically. As cultural resources, rare or endangered species, or research plots are located, that information is shared with the Big Bend National Park Fire Management Program. If fire or fire suppression poses a risk, strategies are developed to mitigate that risk.

At Big Bend National Park, fire observation monitoring (level 2) is required for both fire suppression and wildland fire use. Fire suppression requires only reconnaissance monitoring while wildland fire use requires both reconnaissance and fire condition monitoring. Reconnaissance monitoring includes the following variables: fire cause (origin) and ignition point, fire location and size, logistical information, fuels and vegetation description, current and predicted fire behavior, potential for further spread, current and forecasted weather, resource or safety threats and constraints, smoke volume and movement. Fire condition monitoring includes the following variables: topography, ambient conditions, fuel model, fire characteristics, smoke characteristics, holding options, and resource advisor concerns. Post-burn reports will be prepared by the resource advisor where assigned for their specialties. Other aspect of the report may be filled in by applicable fire staff.

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Level 3 and level 4 monitoring, Long and Short Term Change, are done in compliance with Fire Monitoring Handbook (NPS 2003) at Big Bend NP, TX. Special data needs may use other techniques that those found in the FMH handbook.

In summary, Level 3 & 4 monitoring involves the establishment of transects to measure changes in plant communities. These are randomly placed through out prescribed burn units. The plots are marked with metal stakes and tags. A point transect is used to obtain percent cover and community structure for grasses and herbs. A belt transect is used to determine densities in brush species. Plots in FMU 3 also involved the census of tree species to determine densities. Common to all plots are the photographic points to record and document current conditions. Although these techniques are geared to prescribed burning, they are easily adapted to use in the monitoring of non- fire treatments.

Monitoring Implementation Schedule

A schedule for the measurement of plant monitor plots is found in Appendix A.

Data Management and Analysis

All data is stored electronically in two separate places. These are Dell latitude laptop computer and a desk model Dell OPTIPLEX GX270 located in the FMO. In addition back up disks of all data will be made. Hard copies of the original field forms are maintained and stored in a file cabinet located at the FMO.

Analysis of data is done through the use of the Fire Ecology Assessment Tool (FEAT). The use of the original FMH program may be used until all data is transferred to FEAT. Other statistical packages, such as StatView, S Tabor Mini- Tab, may be used. Analysis on the data is presently being done on request.

Roles and Responsibilities

The following is a brief recapitulation of the statements found in both the BIBE draft FMP and RM- 18.

Fire Management Officer: The Fire Management Officer reports directly to the Chief Ranger of Big Bend National Park. Minimum fire line qualifications for the Fire Management Officer are found in *Interagency Fire Program Management Qualifications Standards and Guide August 2001.*

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The Fire Management Officer is responsible for all wildland fire operations, including the following:

- Directly supervises and coordinates the prevention, preparedness, management/ suppression of fire programs within the Park.
- Develops and updates park fire management plans, including annual appendix updates.
- Monitors fire danger and recommends fire restrictions in concert with neighboring agencies
- Prepares the fire program budget and coordinates/manages all fire funding and accounts.
- Serves as the lead Interagency Wildfire Contact for the Park, maintaining frequent communication with other units of the Southwest Texas Fire Planning Unit as well as state partners.
- Coordinates Park activities with regional fire staff.
- Directly supervises program lead fire staff.
- Approves DI-1202s for all support actions and fires inside the park. Ensures reports are entered into national database.
- Initiates taskbooks for wildland fire positions, certifies completion.

Fire Ecologist, Chihuahuan Desert Parks: Supervises the Fire Effects Module and in coordination with the FMO, is responsible for the periodic review and revision of the Park's Fire Management Plan.

- Assess monitoring reports in relation to project and resource goals and objectives.
- Proposes and secures funding for fire ecology research.
- Develops rehabilitation plans required following suppression actions.
- Serves as the Park's Resource Advisor to the Incident Commander or Incident Team.
- Leads development of monitoring types, including presence/density of non-native plants.
- Facilitates development of multi-year burn plans, to include second or third treatments.

Fire Effects Module Supervisor

- Writes and updates fire monitoring appendix to park fire management plan
- Ensures fire effects monitoring plots are established according to protocols.
- Analyzes data collected from plots and reports findings to parks on an annual basis.
- Makes assessments of effectiveness of fire in accomplishing vegetation objectives.
- Reviews prescribed fire and fuel project plans for objectives and monitoring plans.
- Serves as acting FMO according to skills and abilities.

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- Leads live fuel moisture monitoring program and provides information to interested parties.
- Provides input into ten year treatment plan and monitoring type descriptions.
- Serves as Duty Officer during fire season.

Chief, Division of Visitor and Resource Protection: The Chief Ranger directly supervises the Fire Management Officer. Directs and coordinates support activities between the FMO and District Rangers.

- Contribute to protection-based fire management program objectives.
- Monitor effectiveness of wildland fire management plan implementation.
- Assist wildland fire program with needs for fire investigation and enforcement.
- Ensure effectiveness of park dispatch operation in meeting fire operation needs.
- Participate on Wildland Fire Analysis Team as needed. Provide input to WFIP and WFSA.
- Review and implement fire restrictions, trail and area closures, and evacuations.
- Review fire management plan updates and prescribed fire burn plans.
- Ensure coordination and training of field rangers in fire readiness and initial response.

(i)Chief, Division of Resource Management and Research

- Contribute to resource-based fire management program objectives.
- Support development of multi-year treatment plans and individual project plans.
- Manage and coordinate NEPA/106 compliance, and accomplish compliance as needed.
- Ensure division personnel participate in fire operations to understand fire use and effects.
- Support development of fire effects monitoring types appropriate to park vegetation.
- Support integrated GIS-based risk analysis models such as FARSITE.
- Participate on Wildland Fire Analysis Team as needed. Provide input to WFIP and WFSA.
- Make resource advisors and specialists available to incident/project teams as needed.
- Through park botanist, compile fire effects information for non-native plants and review proposed treatment areas for infestations, and need to re-seed with local native grasses.

Superintendent:

- Ensures safe implementation of wildland fire management program at Big Bend.
- Ensures program supports Service-wide initiatives.
- Approves wildland fire management plan and updates, interagency agreements and operating plans, delegations of authority, prescribed fire

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plans, and management of wildland fire use incidents, through daily updates of WFIP or WFSA.
- Ensure wildland fire management program is appropriately planned, integrated with other programs, and adequately supported by other park operations.
- Approve wildland fire management updates, interagency agreements and operating plans, delegations of authority, and prescribed fire plans in absence of Superintendent.
- Participate on Wildland Fire Analysis Team as needed. Provide input to WFIP and WFSA.
- Ensure an agency representative is assigned to Type 1 and 2 incident commanders.

Regional Fire Ecologist: The Regional Fire Ecologist coordinates monitoring and research needs on a regional level.

- Also s/he provides technical and ecological expertise to fuels, BAER, and other pertinent projects.
- The RFE approves park monitor plans.

Regional Director, Intermountain Region: Authority for the approval of the environmental compliance document for this Fire Management Plan rests with the Regional Director of the Intermountain Region, National Park Service. This position is base-funded by the Intermountain Region and is not a fire-funded position.

Regional Director, Intermountain Region: Authority for the approval of the environmental compliance document for this Fire Management Plan rests with the Regional Director of the Intermountain Region.

Reports and Documentation

Annual Reports

Annual park reports of the activities for the BIBE fire effects group will be prepared to summarizes and document the activities. It should include the number of plots established along with the number of rereads. The establishment of non FMH plot is included. Other information to garner for the report: plant survey, training, number of pay periods worked, data analyses done and fire effect noted in projects.

A second annual report is submitted to the regional office. It includes much the same information as the park report.

Other Reports

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Special report will be prepared as data needs or questions arise. These will be fluid to accomplish the needs of the inquirer. A copy of all reports will be kept on file.

References

Austin, M.P. A.O. Nicholls, C.R. Margules. 1990. Measurement of the realized qualitative niche: Environmental niches of five Eucalyptus species. Ecological Monographs. 60: 161-177.

Bourgeron P.S., H.C. Humphries, R.L. DeVelice, and M.E. Jensen. 1994. Ecological Theory in Relation to Landscape Evaluation and Ecosystem Characterization in Jensen, M.E.; Bourgeron, P.S., tech. eds. 1994. Volume II: Ecosystem management: principles and applications. Gen. Tech. Rep. PNW-GTR-318. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 376 p. (Everett, Richard L., assessment team leader; Eastside forest ecosystem health assessment).

Bourgeron P.C., H.C. Humphries, and M.E. Jensen. 1994. General Sampling Design Considerations for Landscape Evaluation in Jensen, M.E.; Bourgeron, P.S., tech. eds. 1994. Volume II: Ecosystem management: principles and applications. Gen. Tech. Rep. PNW-GTR-318. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 376 p. (Everett, Richard L., assessment team leader; Eastside forest ecosystem health assessment).

NPS. 2003. Fire Monitoring Handbook. Boise (ID): Fire Management Program Center, National Interagency Fire Center. 274 p.

Plumb G. A., 1992. "Vegetation classifications of Big Bend National Park, Texas", Texas Journal of Science Vol. 44 No. 4:375- 387.

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Appendices

A. Monitoring Schedule

BURN UNIT	MONITORING TYPE	PLOT NUMBERS	PRE	BURN DATE	<6 MO.	1 YEAR	2 YEAR	5 YEAR	10 YEAR
PJ Blocks E & F	BAGLE1D02	1	Jul. 97	Jul. 97	Sep. 97	Sep. 98	Jun. 99	2002	2007
Basin Block E	9701	1	Jun. 97	Sep. 97	Oct. 97	Oct. 98	Jun. 99	2002	2007
Basin Block F	BALGR1D05	2	Sep. 98						
Basin Block D	BALGR1D05	3	Aug. 98						
Basin Block K	BALGR1D05	4	Aug. 98						
Basin Block K	BALGR1D05	5	Oct. 98						
Basin Block N	BALGR1D05	6	Sep. 98	May-99	Jun. 99	Jul. 00	Sep. 01	2004	2009
Comanche Draw	BPRGL1D05	1	Jul. 00						
Junction	BDALE1D02	1,2	Jul. 98						
Junction	BAGLE1D02	5,8	Jul. 98						
Junction	BAGLE1D02	10	Aug. 98						
Lone Mountain	BAGLE1D02	2	May-98	Apr. 99	Apr. 99	Jul. 00	Aug. 01	2004	2009
Lone Mountain	BAGLE1D02	4	May-98	Apr. 99	1999	2000	2001	2004	2009
Lone Mountain	BAGLE1D02	11	Sep. 98	Apr. 99	Apr. 99	Jul. 00	Aug. 01	2004	2009
Lone Mountain	BDALE1D02	4,5	Sep. 98	Apr. 99	Apr. 99	Jul. 00	Aug. 01	2004	2009
Pine Canyon	BDALE1D02	6	Sep. 98						
Powerline	BDALE1D02	3	Jul. 98						
Powerline	BAGLE1D02	9	Jul. 98						
Rough Springs	BAGLE1D02	6,7	Jul. 98						
South Rim	FHIGH1D10	1	Sep. 98						
South Rim	FHIGH1G10	2,3,4,5,6,7	Jul. 99						
South Rim	FHIGH1G10	8,9,10	Aug. 99						

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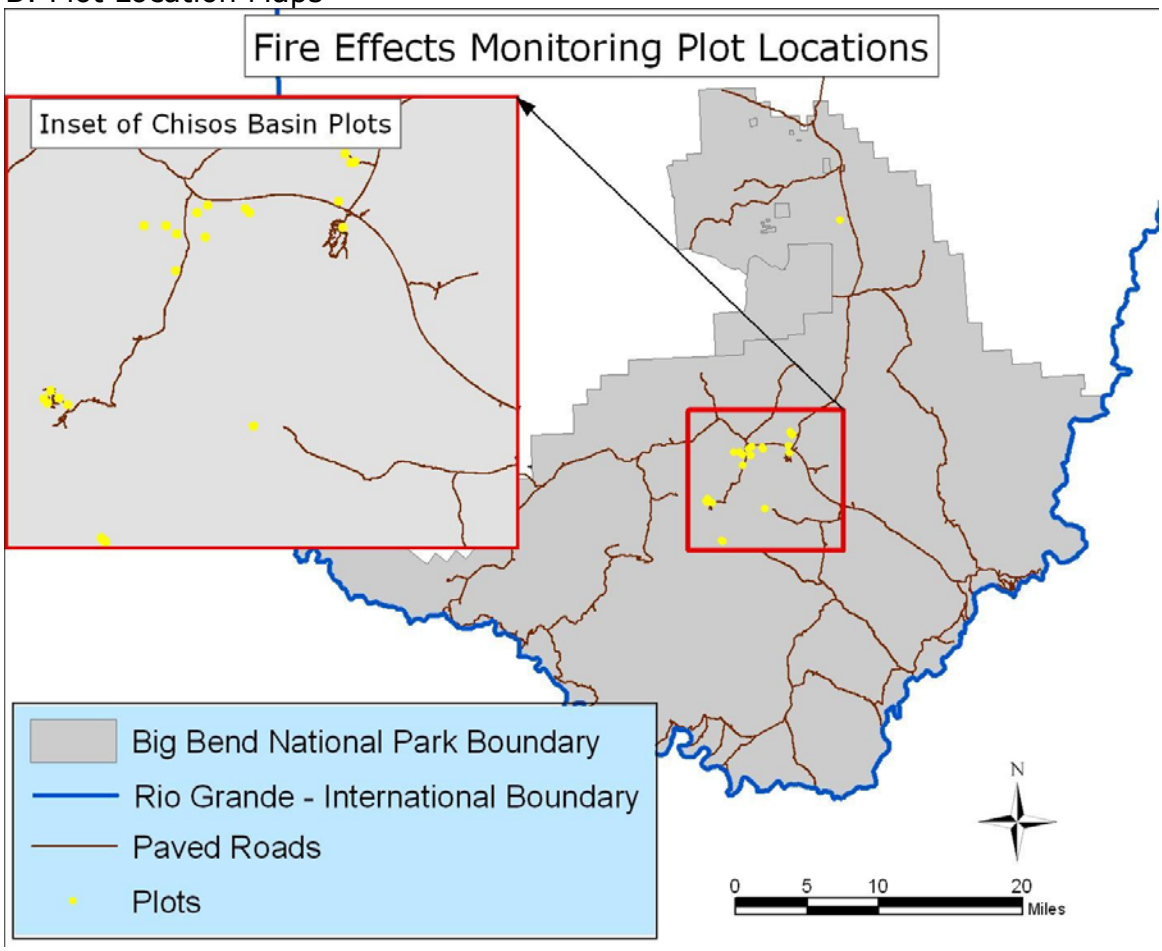
B: Plot Location Maps



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Appendix G: PRE-ATTACK PLAN

Big Bend National Park
Pre Attack Plan

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Reference the Big Bend National Park Fire Management for the following documents: PlanPre-Attack WFSA, Draft Delegation of Authority, Management Constraints
Interagency Agreements, and Pre Positioning Needs(Step-up Plan).

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COMMAND

Evacuation Procedures

CHISOS BASIN
WILDFIRE EVACUATION PLAN

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The Chisos Basin developed area has the potential for a catastrophic wildfire endangering lives and property. With the safeguarding of human life as our primary objective, the evacuation of visitors, employees, and residents in the Basin area to a safe zone will be initiated when a wildfire has the potential to create a life threatening situation in the judgment of the park Superintendent, Chief Park Ranger, or an incident commander in charge of a wildfire in the Basin area. The West District Ranger or their designee will be responsible for managing the evacuation effort. **When implemented, the evacuation effort will take priority over wildfire suppression and structure/property protection.**

Any fire with the recognized capacity to spread into the Basin developed area and/or cut off the evacuation route will cause this Evacuation Plan to be implemented, such as:

- A fire originating at or below the upper Basin; or
- A fire in close proximity to the Basin entrance/exit road.

EVACUATION OPTIONS

The preferred evacuation from the Basin will be **out Route 14** (the Basin Road), utilizing the outbound lane only. Depending on the occurrence of smoke or other hazards, an escort by a marked patrol unit may be needed. Depending on the number of visitors to be evacuated, visitors should be directed to wait in either Panther Junction Visitor Center parking area, K-Bar area, Hannold Draw area, or RGV, until contacted for return instructions. A NPS representative will be assigned to manage and provide information at the chosen area(s).

or

In the event the evacuation route is obstructed to vehicular travel, or there is not enough lead time to evacuate all persons from the Basin, the evacuation will be to **safe areas within the Basin Safety Zone** (see attached maps) located in the Basin developed area. A NPS representative will be assigned to manage and provide information at the safety zones.

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NOTIFICATION PROCEDURES

☐ Dispatch will contact all members of the Wildland Fire Crew and Structural Fire Brigade.

☐ Upon receiving a report of fire in proximity to the Basin, Dispatch will alert the Fire Management Office, Chief Park Ranger, and the West District Ranger.

ACTIONS TO BE CONSIDERED IF SIZE-UP INDICATES A THREAT TO LIFE AND PROPERTY:

☐ Expanded dispatch should be initiated.

☐ Traffic control will be the next priority to insure emergency vehicle access to the Basin is maintained and evacuation efforts, if needed, are safe and orderly. Protection employees with emergency vehicles should be deployed at the following intersections/locations unless otherwise directed by the IC:

1. Junction of Routes 13 and 14, to prevent visitor traffic flow into the Basin.
2. Intersection of Basin Road and campground access road, to direct evacuation traffic.
3. Basin developed area to assist traffic control out of the Basin, or parking and staging of persons in the safety zone. A safety zone has been identified for staging of persons in the Basin (see attached map).
4. Lost Mine Trail parking area to ensure vehicles do not hinder emergency access/egress.

☐ The Basin concessionaire **manager** or his/her designee will be alerted of the fire and to prepare their staff for a possible need to evacuate. **Visitors should not be notified by the concessionaire until specifically directed to do so.** If so directed by a NPS authority, a designated person from the concessionaire will initiate evacuation of lodge/motel/stone cottage guests and employees. The concessionaire will maintain approved procedures to assure that all persons within their assigned areas are notified and instructed what to do. Once the initial notification is completed, a follow-up check by the concessionaire will be done to assure

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that all have safely followed instructions. A checklist of people contacted/evacuated will be maintained, if time permits.

- ☐ All available employees (and Border Patrol, Sheriff's Office, if available) will be made available and utilized as needed in the evacuation and suppression efforts. **Park functions may be shut down to support the evacuation effort.** Personnel not responding to the suppression efforts should stage at the Panther Junction Emergency Services Building (ESB) to receive a briefing and assignments. A person will be assigned to coordinate/direct the resources at the ESB.

- ☐ Two employees will be designated to proceed to the Basin family and group campgrounds to direct visitors on evacuation procedures.

- ☐ A designated NPS person and concessionaire representative will notify residents and assure evacuation of the residential area/remuda.

- ☐ If Route 14 is open and being used as an evacuation route, a park employee will notify visitors and assure evacuation of the Chisos Basin visitor center and parking lot area.

- ☐ Visitors on the Lost Mine, Window, Laguna Meadows, Pinnacles, Basin Loop, Window View, and Oak Spring Trails may be contacted depending on fire behavior and lead time available, and notified of the quickest/safest escape route out of the Chisos Mountains, or to the nearest safety zone.

- ☐ Extreme caution will be exercised in sending any foot patrol into the High Chisos if a fire is reported in the Basin.

- ☐ Depending on all factors (including lead time), the park plane may be dispatched to assist with fire reconnaissance or message drops for the purpose of contacting backcountry users.
- ☐ Rotary wing aircraft may be needed if evacuation of the Chisos backcountry is imminent. U.S. Border Patrol, Customs, or Lincoln Zone aviation resources may be available.

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☐ Medic One and, if needed, the Terlingua Medics should be made available to respond to the Basin developed area as needed.

☐ Designated persons, as available, to assist/instruct visitors exiting the Chisos Mountains via Blue Creek, Juniper Canyon, and Pine Canyon (if needed).

☐ A checklist of people contacted/evacuated will be maintained, if time permits.

BASIN SAFETY ZONE

- In the event the evacuation route is obstructed to vehicular travel, or there is not enough lead time to evacuate all persons from the Basin, a "Safety Zone" will be established in the Upper Basin area consisting of the upper developed area of the Basin: Visitor Center, motel units, lodge, camper store, and all associated parking areas (see attached map).

- The concessionaire has 72 associated lodging units accounting for approximately 150-200 persons. The Basin Campgrounds when full would add approximately 200-250 people. An estimate of persons being in or around the Basin, including day-use plus employees, is 400-450 during the busy periods.

- "Safety zones" will be used to house visitors during the immediate threat of an advancing wildland fire in the Basin. The following are "safety zones" to be used: concessionaire lodge, Basin visitor center, camper store, motel units, large parking lot in center of developed area, and amphitheater parking lot. Number of parking spaces available is approximately:

Lodge/Restaurant: 45
Rooms/VC: 150 (Includes spots behind old motel units)
Amphitheater: 50
Lost Mine: 15 plus oversize vehicle parking

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- Vehicle traffic will be limited. Parking for incoming visitors already in the basin will be behind the Lodge, behind the single story motel units, and the amphitheater parking area. Efforts will be made to keep the main lot accessible for movement of emergency vehicles. Access to the fire bay and fire hydrants must be maintained. To maximize safety zone space, campers should not be permitted to drive their vehicles from campsites. Campers and residents should be directed to walk to the nearest safety zone.

- Fire protection will be provided by trained personnel with the existing fire hydrants, pumpers, and structural engines.

- To ensure adequate water supply for critical life protection, the concessionaire may be requested to shut down water distribution systems within their facilities.

PREPAREDNESS

The West District Ranger will conduct a walk-through drill with the concessionaire and key park staff annually to insure preparedness. The Management Assistant will insure the concessionaire has a current, approved evacuation plan in accordance with this Plan.

High Chisos Backcountry Campsite Evacuation Plan (*THIS IS A DRAFT PLAN*)

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The High Chisos Backcountry Campsite Evacuation Plan will pre-plan for the evacuation of the High Chisos campsites. Fuel loadings, extreme terrain, isolated nature of the campsites and the inability of park management to contact visitors during wildfire events necessitate the formation of this plan to protect human life. This plan intends to address concrete steps that will be taken in order to facilitate evacuation. It is also recognized that environments on the fire ground are extremely dynamic and changes to this plan may need to be made to this plan at any time to ensure firefighter and public safety needs are met at all times.

COMMUNICATION TO VISITORS THE RISK OF WILDFIRE AND NEED FOR POSSIBLE EVACUATION

These steps will serve to educate the visitor about the risk of wildfire in the High Chisos. It will also give visitors the opportunity to pre-plan evacuation routes and ask questions of park staff before visiting the backcountry campsites.

Dec. ’04/Jan ‘05

Big Bend NP Dispatch began posting Daily Fire Danger Rating for the Park on the Daily Report. This Report is broadcasted over park radio frequencies, informing employees involved in emergency operation of the Fire Danger for the day. The Daily Report is also posted at all visitor centers inside the park and outside the park at cooperating businesses and Texas State park facilities.
These postings will serve as notification to park visitors and cooperators of the current fire danger level.

Spring ‘05—

Visitor centers will post High Chisos campsite evacuation information at visitor centers and bulletin boards informing visitors of necessary precautions while hiking in this isolated area.

Interpretation and Visitor Services will begin attaching an Evacuation Card to each High Chisos backcountry campsite permit during periods of High, Very High, and Extreme Fire Danger in the Chisos Mountains. This card will

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educate the visitor of what actions to take to facilitate evacuation. The Fire Danger Rating for the Chisos Mountains is available from the USFS R3 Wildland fire Website. This information is compiled from weather readings from the Fire Weather Station in the Chisos Basin Developed area.

DURING WILDLAND FIRE EVENTS

One individual will need to be placed in charge of Chisos Backcountry evacuation. An ICS unit log will need to be kept by this individual to document actions taken.

Upon verification of a wildland fire in the Chisos Mountains that may be dangerous to visitors it will be necessary to notify all visitor centers of a closure of the High Chisos Backcountry campsites. Closure signs will need to be posted at all trail heads leading into the high Chisos as soon as possible.

It will be necessary to compile a list of all active backcountry permits in the High Chisos. From that list critical information will need to be extracted from the permit (i.e. Name of permitee, # of persons in party, vehicle information, where their campsite was when the fire was reported.)

Once extracted this information will show the # of individuals that need to be accounted for to ensure that public safety needs in the High Chisos have been met and the area is secure.

It will be made known to all personnel involved with the incident that information will have to be relayed to dispatch to document visitors from the High Chisos have been accounted for and their current status .

Provisions will be made to track and document any day hikers that are know to be in the high country during a wildland fire. (Day Hiker Trail log system establishment?)

If possible an EMS team will need to be activated to provide care for the public and incident personnel.

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Once all public has been accounted for (permitees and day hikers) the High Chisos will be declared secure from all non-incident personnel.

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OTHER CONSIDERATIONS

If arson is suspected any individual with a backcountry permit or anyone in their party will be interviewed by Law enforcement to gather pertinent facts related to the wildland fire.

Trail crew may be working in the High Chisos. They may be a good resource to assist with backcountry evacuation.

Only certified wildland firefighters should be used to carry out foot patrols in the areas near the wildland fire.

Foot patrols or other personnel inserted via helicopters for evacuation will need to evaluate safety at all times. 10 Standard Fire Orders and the 18 Watch out situations will be adhered to at all times.

Visitors that stayed in the backcountry and were evacuated will be a good source on information on how smoothly the evacuation took place. They will be a good source of information to help improve procedures related to this plan.

Structural Protections Needs

A structural assessment of all structures in the Basin Developed Area and Panther Junction Housing and Headquarters is underway. Once the risk to Wildland fire is completed it will be placed in this binder to help facilitate structure protection in a wildland fire incident.

Engines 811 and 812 (both Type I Structure Engines in the Park) have Structure Pre-Plan Binders to assist in Structure fire Incidents.

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Closure Procedures

The following is reproduced from RM-18 Chapter 7 Exhibit 4. Version 2.0

January 24, 2005

GUIDELINE FOR DETERMINING NEED FOR PARK CLOSURE/EVACUATIONS
The following questions are presented as a guideline to assist park fire managers in determining the present or predicted necessity for evacuation of all or part of the park. The superintendent will make the final decision for closure/evacuation. Because of the critical time elements involved in closure and evacuation, this checklist should be completed at any time two or more
elements in primary factor A are positive and should be kept as part of the park's fire records. This analysis should be based on predictions to allow adequate time for implementing the appropriate action.

For purpose of this guideline, key terms are defined as follows:

1. Partial closure: Park closure to visitors in specified areas.
2. Full closure: Park closure to visitors at entrances.
3. Evacuation: Removal of employees' families and/or visitors from the park.

The following steps are to be taken to make determinations:

1. Analyze each element and check the response "yes" or "no."
2. If positive responses equal or exceed negative responses within primary factors A through D; the primary factor should be considered a positive response.
3. Primary factor E is considered as a separate determinant.
4. Employ the following criteria to determine action:

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a. If factor E is "no" and one other primary factor is "yes," consider full or partial closure.
b. If factor E is "no" and two or more primary factors are "yes," consider partial or full closure and evacuation of visitors.
c. If factor E is "no" and three or more primary factors are "yes," consider evacuation of visitors and employees' families.
d. If factor E is "yes," evacuate visitors and employees' families regardless of responses to other primary factors.

A. FIRE BEHAVIOR (observed or predicted)
YES NO
1. Burning Index, Fuel Model L, 54 or above (VH to EX).
2. Crowning or spotting observed.
3. Rate of spread 80 chains (1 mile) per hour or greater.
4. Fire Size: 300 acres or more
5. More than two Class C size fires (>10 acres) burning concurrently.
TOTAL

B. PERSONNEL COMMITTED PARKWIDE
YES NO
1. Unusual initial attack forces committed.
2. Park cooperative agreement crews committed.
3. Park incidental firefighters committed.
4. Fires remaining unstaffed after commitment of above park forces.
5. Relief forces more than two hours away.
TOTAL

C. OPERATIONS

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YES NO
1. Access/egress route likely to be heavily used by suppression traffic.
2. Extensive air operations in vicinity of developed areas.
3. Potential incident base location in area which conflicts with routine visitor activities.
TOTAL

D. **LOCATION AND DIRECTION OF SPREAD**
YES NO
1. Fire north of developed areas, proceeding south.
2. Fire south of developed areas, proceeding north.
TOTAL

E. **EXIT**
YES NO * Any vehicular egress route directly threatened for extended period (i.e., to point where no traffic could safely get through).

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Logistical Considerations

Incident Command Post and Base Camp Locations

Many possibilities exist with different levels of services and different sizes. Depending on the size of the incident and its corresponding needs a combination of these sites could be used. Other possibilities may exist that are not listed here.

Locations with Water and minimal Electricity:
Chisos Basin Campground (60 sites with 24 ft limit vehicle size)
Chisos Basin Group Campground (7 sites for 104 people)
Cottonwood Campground (32 sites, pit toilets, limited water, no electricity)
Cottonwood Group Campsite (25 persons)
RGV Main Campground (100 sites)
RGV Group Campground (4 sites for 120 persons)
RGV RV Site (25 full hook ups)
RGV Overflow areas (400 + persons, limited water, primitive).
K-Bar Gravel Area just north and east of Ranch house (150' X 350')
San Vicente ISD School grounds, offices, classrooms and gym at Panther Junction.
San Vicente ISD Baseball Diamond and Playground area (350' X 300')

Primitive Sites. No water or electricity available. With Resources approval, some of these sites may be able to be improved and enlarged with a road grader, front end loader or other heavy equipment.

--RT. 12 Mile 5 Borrow Pit (100 feet X 150 feet)
--Dagger Flats Borrow Pit. ½ mile east on Dagger Flats Rd; south side. (150' X 350')
--RT. 11 just before mile 8 on west side of road.
(750' X 350')

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--Hannold Draw campsite and Borrow Pit.(780’ X 150’)

Roads, Trails and Logistical Considerations

Trails Illustrated topographic maps are available at all Visitor Centers. A full set of topographical maps (1:24,000 scale) is available in Park Dispatch. These maps will show most roads and trails that can offer access to fires for logistical support. Other information on historic roads and powerline access roads can be accessed in Resource Management. On the Dispatch computer Terrain Navigator software is installed to provide computerized topographic maps for easy access, printing and distribution. On the FMO and Supervisory Forestry Technician computers Terrain Navigator is also available to access road and trail information for logistical support of fires.

Limitations to vehicle size and capability on backcountry roads are present. Precipitation will play a large part in how passable the backcountry roads are. 4X4 Type 6 and 5 engines will not have any problems on any backcountry roads unless it has rained recently. Due to the dynamic nature of the backcountry roads specific conditions will not be mentioned here. The latest information will be available through park dispatch and the Incident Commander of the incident.

General Medical Services

PARK’S MEDICAL CONTROL IS DOCTOR DAVE SPEAR:
PO BOX 13831, ODESSA 79768
PAGER.....(432)499-6638
HOME.....(432)381-0203
MEDICAL CENTER ODESSA..... 1-888-624-3571
FAX..... (432)385-1665

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ALPINE
IF OUR MEDICAL CONTROL IS NOT AVAILABLE CALL THE BBRMC IN **ALPINE.** IDENTIFY YOURSELF AND EXPLAIN YOUR MEDICAL SITUATION (**MAKE SURE YOU ARE TALKING WITH A P.A. OR AT LEAST AN R.N. AND WRITE DOWN THEIR NAME ON YOUR RADIO LOG**).

BIG BEND REGIONAL MEDICAL CENTER. . . . ….. … .. (432) 837-3447
EMERGENCY ROOM . . . . . (432) 837-0209

LAJITAS CLINIC 9-1pm, and 2-5pm Wed-Fri
(lab work, ekgs, some meds, x-rays)
(432) 424-5111 *or* (432) 424-5112
After hours and weekends (432) 424-5000
PA John Alexander (can call with questions or evaluation) HOME (EMERGENCIES ONLY).424-3343

MARATHON RURAL HEALTH CLINIC 8:30am-noon, 1-5:30p Mon & Thur
(432) 386-4316

FT. STOCKTON
PECOS COUNTY MEMORIAL HOSPITAL. . . . . .(432) 336-7515

MIDLAND/ODESSA
MIDLAND MEMORIAL HOSPITAL. . . . . (432) 685-1111
ODESSA MEDICAL CENTER . . . . . (432) 640-1190

SAN ANTONIO
BROOK ARMY HOSPITAL. . . . . (210) 916-4141
BURN UNIT (DIRECT LINE). . . . . (210) 916-2720

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DALLAS
PARKLAND HOSPITAL. . . . . (214) 590-8000
BURN UNIT (DIRECT LINE). . . . . (214) 590-5524

EL PASO
THOMASON HOSPITAL. . . . . (915) 544-1200
WILLIAM BEAUMONT - FT. BLISS. . . . . .(915) 569-2121
569-2333 (EMERGENCY)
PROVIDENCE MEMORIAL HOSPITAL. . . . . .(915) 577-6011
577-6551 (EMERGENCY)

AMBULANCE SERVICE
TERLINGUA MEDICS

Business Only. . . . . (432) 371-2536
Emergency Only. . . . . (432) 371-2222
FAX. . . . . (432) 371-2546

ALPINE
MIKE SCUDDER (THROUGH ALPINE PD) . . . . (432) 837-3486
HOME. . . . . .(432) 837-7471

FT. STOCKTON (VOLUNTEER). . . . . .(432) 336-4600
. . . . . OR **911**

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MARATHON (VOLUNTEER) (THROUGH ALPINE PD) (432) 837-3486
. . . . . BUSINESS (432) 386-4517
. . . . . HOME (432) 386-4508

MARFA. . . . . . (432) 729-3151
SHERIFF'S OFFICE- AFTER HOURS (432) 729-4308

POISON CONTROL CENTER

GALVESTON (Main Number) 1-800-392-8548
ODESSA 432-333-1231
. . . . . (800) 764-7661

TEXAS DEPT OF HEALTH
PRESIDIO. . . . . .(432) 229-3481 OR 229-3236
ALPINE. . . . . .(432) 837-3877

POLICE PSYCHIATRIST (COUNSELING IF A FATALITY)

Rick Bradstreet - Austin Police Dept. . . . . .(512) 974-5000
Kevin Gilmartin - Tucson, AZ (retired). . . . . .(520) 322-5600
Police Psychologist for Houston P.D. . . . . (713) 222-2555

Medical Air Transport Resource Information

Midland Center Hospital, Odessa TX 1 888 624 3571

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Life Flight A-Star Helicopter

Shannon Medical Center Life Flight San Angelo, TX (2HR ONE WAY TRAVEL TIME)	1-800-277-4354
Lifeguard Air Ambulance Services Ft. Worth, TX	1-800-248-5437
Aero Care Lubbock, TX	1-800-248-5437 1-800-744-5055
MILITARY ASSISTANCE TO TRAFFIC Ft. Bliss, TX (EL PASO)	(915) 568-8834 (EMERGENCY #) (915) 568-8833 (EMERGENCY #) (915) 568-8128 (OPS QUESTIONS)

Federal Cooperator Air Craft
U.S. Border Patrol

AIR OPERATIONS P.O. DRAWER I MARFA, TEXAS 79843	729-3313 (AIR OPS OFFICE) 729-4353 (DISPATCH)
CHIEF: J.W. CLIFFORD	729-4707 (HOME)

`

TYPE OF SERVICE/AIRCRAFT/STAFFING

HUGHES 500 (C OR D)

DEL RIO, TEXAS 210/774-1705
2 HOUR RESPONSE TIME

U.S. Customs

SAN ANGELO/SAN ANTONIO 432 /942-6800 (24 HOUR)
P.O. BOX 62390
SAN ANGELO, TEXAS 76906

BRANCH CHIEF: ROBERT VIATOR

TYPE OF SERVICE/AIRCRAFT/STAFFING

CITATION, BLACKHAWK

ALBUQUERQUE/EL PASO 505/262-6425 (24 HOUR)
P.O. BOX 9209 ATO
ALBUQUERQUE, NEW MEXICO 87119

BRANCH CHIEF: HARRY BETTS

TYPE OF SERVICE/AIRCRAFT/STAFFING

`

CITATION, BLACKHAWK (ALB)
A-STAR, AEROSPECIAL AS350 (EL PASO)

Stores, Restaurants, Service Stations

Chisos Basin Lodge Restaurant operated by Forever Resorts offers meals for incidents. 432-477-2291 or 2292.

There are several restaurants in Terlingua that are willing to provide meals to incidents.

Chili Pepper Café:	371-2233
Big Bend Motor Inn:	371-2448
Tivo's	371-2133

River outfitters may be willing to prepare lunches for incidents as well.
There are three stores in the Park operated by Forever Resorts. The Study Butte Store in Study Butte has the largest inventory of supplies for support of incidents.

There is one service station operated by Forever Resorts in the Park at Panther Junction. It offers gasoline and diesel. There are 2 service stations offering gasoline and diesel and outside the park in Study Butte.

Terlingua Auto Service is the closest full service mechanic. BIBE auto shop has full service.

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Utilities
Rio Grande Electric

ELECTRICAL Coop (432) 729-4318 or (800) 460-0679
Andy White Park Electrician: Wk 477 1135 or Hm 477 2493

WATER

John Lowe Buildings and Utilities Foreman.	Wk 477 1131
	Hm 477 2553
PJ Water Treatment Plant	477 2278
Eric Stark, Park Plumber	477 1135

PROPANE
John Lowe Buildings and Utilities Foreman Wk 477 1131 Hm 477 2553
Will assist with shutting off and locating lines and tanks.

Mustang Propane supplies the park with propane.

`

Transportation Resources

Big Bend Fire Mgmt Program has 2 Buses to Transport Firefighters.

1. International (Automatic Transmission) 16 passengers +1 Driver
2. GMC (5 speed Split Differential) 28 passengers +1 Driver

Individuals with Commercial Drivers License:

BIBE Employees:	Tony Gonzalez	
	Steve Benavidez	477-2406
	Mark Yuhas	477-2389
	Pat Russ	371-2305
	Gary Luce	477-2468
	John Zubia	
San Vicente ISD:	Peggy Lipscomb	477-2377
	Jim Oberkrom	477-2572
Terlingua	Jim Goodnow	432-371-2951
	Pierre De Koninick	432-371-2523
	Cell	432 294 3506
	James Oak	432-371-3069

River Outfitters in Terlingua may have CDL drivers that can assist with Transportation needs.

Bus Companies that can supply drivers and a Bus.

`

Expeditors 800 255 3119
Lincoln Express 505 384 5480
Carlsbad ISD--Harly Ballard 505 887 1235
Cell 505 706 2223
505 885 4884

Roberts Fleet Bus--Phil Eucker 505 937 0800

Lincoln Zone Dispatch can arrange transportation with contracted and inspected vehicles.
505 437 0778 or the 24 hour # 505 437 2286 or 877-695-1663

OTHER DRIVERS:

CAN USE ANY OF THE ROADS CREW AS DRIVERS FOR ANY NON-ALS EMERGENCY:

ART CASH	CDL	LOOK IN ROLODEX
DOUG FAGG	CDL	477-2207
TRAVIS SIMMONS	CDL	LOOK IN ROLODEX
GENE FOSTER	CDL	477-2235

Rental Equipment Sources

ATV's. – Texas River Expeditions has rented ATV's for prescribed fire support in the past. 432-371-2633

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Lincoln Zone Dispatch would be the best resource to get rental equipment for incident support. They have lists of Contract Engines, Tenders, Crews, Port-a-potty, etc. They will also have the resources to contact national sources of rental equipment for full support of incidents.

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Toilets
Per Al Mayton, head of Maintenance at Rio Grande Village the Park has 6 port-a-potties that could be set up for initial incident support. These 6 could support up to 180 people per day if the port-a-potties were serviced on a daily basis. 6 more port-a-potties could be pulled from existing sites to supplement the previous six. Bringing the total to 12 port-a-potties servicing 360 people per day. This type of activity could only be maintained for a few days. It's recommended that if more than 6 port-a-potties are needed that outside assistance be requested. Lincoln Zone Dispatch can assist in getting contracted sanitary facilities for large incidents.

Local Fire Departments

ALPINE (432)837-3486
109 N. 8TH
ALPINE, TEXAS 79830

TERLINGUA AREA VFD (432)837-3486
(dispatched by Alpine PD)
P.O.BOX 241
TERLINGUA, TEXAS 79852

Terlingua's Equipment:

(1) 1000 gal 10 Wheel Driver Pump (not functioning 06/2005)
(1) 275 gal WEPS 1 ton (Foam Truck)
(1) 400 gal Pumper Truck 1 ton

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(11) Members (1) ECA

MARATHON
Dispatched by Brewster County Sheriff's Office (432) 837-5541

STATE FIRE MARSHALL

AMARILLO-RICHARD BEALS
(806) 468-5861

AUSTIN-
(512) 305-7900

Lincoln Zone Coordination Center	(505) 437-2286 or (877) 695-1663
Alamogordo, NM	
Harry Phillips, Center Manager	(505) 434-7354 Cell(505) 430-4349
Beth Spencer, Asst. Center Manager	(505) 434-7352 Cell(505) 430-4380

Texas Interagency Coordination Center	888-324-8707
Lufkin, TX	
Cynthia Foster, TxFS	

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Communications

LOCAL RADIO FREQUENCIES FOR BIG BEND NATIONAL PARK

Portable and Mobile Radios (Revised February 23, 2006)

CH.	AGENCY / FUNCTION	RECEIVE	PL-TONE	TRANSMIT	PL-TONE
01	NPS-LE EMORY	172.600	103.5	169.800	103.5
02	NPS-LE LOCAL	170.075	107.2	170.075	107.2
03	NPS-LE P. GAP	170.075	107.2	168.375	107.2
04	NPS-LE PORT. RPTR.	172.600	103.5	169.800	123.0
05	NPS-ADMIN-EMORY	166.375	192.8	166.975	192.8
06	NPS-ADMIN-LOCAL	166.375	192.8	166.375	192.8
07	NPS-ADMIN 3-4 RPTR.	166.350	192.8	166975	192.8
08	NIIMS LOCAL	168.550	127.3	168.550	127.3
09	ALLIANCE-SUE PEAK	169.450		171.075	100.0 (DES)
10	MEDICS-CHRISTMAS	155.160		153.890	192.8
11	MEDICS LOCAL	155.160		155.160	
12	USC LOCAL (also USDA)	165.2375		165.2375	(DES)

`

13	USBP ORD	163.700	100.0	162.900	100.0	
14	BC-EMORY	155.655	136.5	154.830	136.5	
15	BC-ELEPHANT	158.790		154.710	162.2	
16	BC-LOCAL	158.790		158.790		
17	ALLIANCE LOCAL	169.450		169.450		(DES)
18	ALPINE HOSP. LOCAL	155.340		155.340		
19	BC-BIRD (Marathon)	158.790	141.3	154.710	141.3	
20	USC-PEPPER (Terling.)	165.2375		166.4375		(DES)
21	USBP.ORD (Alpine)	163.775		162.975	123.0	
22	TX P&W LOCAL	151.415		151.415		
23	DPS LOCAL	154.950		154.950		
24	Texas Forest Service Statewide	154.280		154.280	No Tones	
25	*Air to Ground Lincoln Zone both Tx and Rx 166.6875 no tones.*					

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Sanitary Landfills

Big Bend National Park has its own landfill but due to its size and purpose use of this landfill for large incidents isn't recommended.

The nearest landfill for large incidents would be the

Alpine Landfill. 432 837 1168

Portable Water Sources

BIBE Fire Management has 2 1800 gal. Pumpkins and 1 1500 gal Port-a-Tank. Maintenance has a 3000 gal Tender. In the Helitak Shak there is a 125 gallon Blivit that can be transported via helicopter.

Maintenance Facilities

BIBE Park has a full service auto shop.

Terlingua Auto has a nearly full service shop and Tow Truck 432 371 2223.

Contact Information for other Auto and Truck Shops and Tow Trucks is available through BIBE Park Dispatch.

It would be recommended to bring a full Ground Support Unit for large incidents due Big Bend National Park remoteness.

`

Operations

Helibase, and Helispot Locations

Park Headquarters (Panther Junction) heliport lat/log is
N 29º 19.30’ W 103º 12.37’

Bearing from Marfa VOR: 135º

Distance from Marfa VOR: 70 nautical miles

The PJ Helipad could accommodate 3 Type 3 Helicopters. Any change in that configuration would need to be approved by the FMO and the Lead of the Park Aviation Plan or Helibase Manager of Incident.

Many other possibilities exist for Helispots and Dip-sites throughout the park. Laguna Meadows and South Rim areas have been used for helispots. The pullout on the north side of the road just before the Remuda has been used as a dip site.

They following are suggested Helispots and Dip sites. Each area will need to be scouted for hazards and exact location of Helispot and location of Dip Tank.

`

Sotol Vista Helispot and Dip site (paved parking lot):

N29 12’ 52.4” W103 22’ 35.1”

Oak Springs / Cat Tail Falls Parking Helispot and Dip site (gravel):
Large Hill to the East of Helispot.

N29 17’ 00.0” W 103 21’ 01.2”

Sam Nail Helispot and Dip site (gravel):

N29 16 42.3 W103 21 51.3

Basin/Remuda Dip site: Hazards Present: Power lines, campground and Trees.

N29 16 28.8 W103 18 15.8

In mountainous areas some pilots have reported unfavorable winds for low level operations.

`

At the time of writing Lat and Longs for helispots or dip sites other than Panther Junction will need to be confirmed and Lat and Long determined.

AIRCRAFT

UNITED STATES BORDER PATROL
MARFA, TEXAS 79843
P.O. BOX I
ROGER AIMS (432)-729-5200(DISPATCH)
AIR OPERATION SUPERVISOR. . . . . .(432)-729-3313 (WORK)
(432)-729-4707 (HOME)

UNITED STATES BORDER PATROL
DEL RIO, TEXAS
DREW DUNCAN. . . . . .(830)-703-2100 EXT.600
BRANCH CHIEF OF AIR OPERATIONS

TEXAS DEPARTMENT OF PUBLIC SAFETY
MIDLAND, TEXAS 79703
2405 S. LOOP 250 WEST
JOHN BRANNON. . . . . .(432)498-2130 DISPATCH
CHIEF PILOT (432)-498-2100

LANGLEY AIR FORCE BASE COORDINATION CENTER. . . . . (800)-851-3051
(Call this number for C.A.P. resources)

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UNITED STATES CUSTOMS

1) SAN ANGELO, TEXAS 76906

P.O. BOX 62390
MARTIN VAUGHN. . . . . .(325)-942-6800 (24HRS)
BRANCH CHIEF AIR OPERATIONS BRANCH

UNITED STATES CUSTOMS

2) ALBUQUERQUE, NEW MEXICO 87119

MARK SCHINDLER. . . . . (505)-346-6425 (24HRS)
BRANCH CHIEF '0' FOR OPERATOR
AIR OPERATIONS BRANCH

SECTOR ORLANDO, FL. . . . . (800)-973-2867 (24HRS)

(ii) WHEN YOU CALL SECTOR IN ORLANDO, FL FOR A LANE CHECK MAKE SURE YOU IDENTIFY YOURSELF AS **NPS-1580**, THEN MAKE YOUR REQUEST.

F.A.A. FLIGHT SERVICE STATION . . . . . .(800) 433-8102
SAN ANGELO, TEXAS
TO FILE FLIGHT PLAN. . . . . (800) 992-7433
THEN,#*(TONE)*99, THEN GIVE INFO

`

AVIATION MANAGEMENT DIRECTORATE (AMD)
P.O. BOX 15428 BOISE, ID 83715-5428

TO REPORT AIRCRAFT ACCIDENTS (AMD – 24 hr) . . . . .(888) 464-7427
FLIGHT COORDINATION CENTER (AMD Boise) . . ..(208) 334-9314
AVIATION ACCIDENT PREVENTION & SAFETY MANAGEMENT. . . . . .(208)387-5800

National Park Service Aviation Contacts
Cliff Chetwin, IMR Aviation Specialist……. (303) 969-2657
Bill Spruill, WASO Aviation Manager…….. (202) 513-7134

NOTIFY CUSTOMS WHEN PARK AIRCRAFT FLYING
RIVERSIDE, CA, ASK FOR THE NEW MEXICO DESK. .. .(800)553-9072
DIRECT TO TEXAS PERSON. . . . . .(909)656-8060
SENIOR DETECTION SPECIALIST. . . . .(909)656-8050

CESSNA MODEL 206, NPS104PS, "NPS PATROL" IN BLACK LETTERING ON WINGS, USUALLY SQUAWKING 1200 ON TRANSPONDER

ALBUQUERQUE AIR ROUTE TRAFFIC CONTROL CENTER
(To request a temporary flight restriction, refer to park aviation management plan, Chapter 4) . . . . . (505)856-4591
(505)856-4654(fax)

**** FOR AMD APPROVED HELICOPTER VENDORS, SEE ATTACHED LIST, CURRENT LISTS WILL BE PROVIDED BY PARK PILOT ****

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AIRPORTS

i) HARTE RANCH AIRSTRIP (BIBE Park Owned and Maintained – not open to public)

ii) 432 371 2398

a. N29 35 28.37 W103 15 58.30

b. Length: 3100 feet gravel airstrip

ALPINE MUNICIPAL AIRPORT (E38). . . . . .(432)837-5929fax
FORT DAVIS HWY, ALPINE, TX (432)837-3009
8-6PM 7 DAYS/WEEK

MOORE AIRCRAFT. . . . . .(432)729-3102
MARFA, TX (JOE MOORE). . . . . HM (432)426-3100

HARGUS AVIATION. . . . . . (432)336-3151
FT. STOCKTON/PECOS COUNTY AIRPORT
FT. STOCKTON, TX 79835

MIDLAND INTERNATIONAL AIRPORT. . . . . . (432)560-2200
MIDLAND, TX

TERREL COUNTY AIRPORT. . . . . . (432)345-6731

`

SANDERSON, TX

PRIVATE AIRSTRIP (INFORMATION NOT FOR VISITORS)

PITCOCK ROSILLOS RANCH- FOR PARK USE IN EMERGENCIES, PHONE

Sid (husband) and Mike (wife) Ferris at 477-2266 Managers

ROY PITCOCK Owner AT (800)234-1262,

TO GET PERMISSION AND TO GET GATE UNLOCKED.

- Paved 4100 feet long airstrip and at 3100 feet elevation.
- 12 miles from Park Headquarters and close to Chisos Mountains.

Lajitas Resort Airport (89TE)(432) 424-5000 or 424-3544 (airport)

- Location N 29 15 45 W 103 46 30
- 7500 feet paved, lighted and hangers at 2500 feet elevation.
- Fuel available. Possible to obtain permission for SEATS and Large Air Tankers to land and refuel.

Flight Routes and Restrictions

Flight Route information, local airport Lat and Longs and other aviation information are available in the BIBE Dispatch Mobilization Guide.

The BIBE Aviation Management Plan in Big Bend Dispatch Center contains an Air Craft Pre-accident plan and overdue aircraft procedures.

`

Procedures for requesting Air Space/Flight Restrictions is found in the BIBE Aviation Mgt. Plan.

Aviation Hazards map for the Park is in the District Rangers office next to the Helipad at Panther Junction.

Water Sources

The Rio Grande River, Tule Tank on the east side of Tule Mountain, and the Chisos Basin Sewage Lagoons are three permanent **potential** sources of water. Use of these sources will need to be confirmed. Other sources will have to be arranged with logistical support. See the Logistical Considerations part of this plan for portable water sources.

Panther Junction, Rio Grande Village, Castolon and the Chisos Basin have public water supplies that can support suppression efforts. They all will require tie in at a hydrant or stand pipe.

`

Control Line Locations

Roads

Existing paved and dirt roads will provide the best control lines for a Wildland fire incident. Refer to the full set of (1:24,000 scale) USGS topographic maps in park Dispatch or on Engines 3 and 4.

Other opportunities exist for using power line access roads. Resource Management employee (Alex and Corrick) have good knowledge of the location and maps of the roads. The FMO(Morlock) also has knowledge of the location of these roads. At the writing of this plan it is unknown if these roads are marked on any maps in the park. It will be necessary to improve these roads for access and use as control lines since they only get occasional use.

Historic Roads also offer potential for location of control lines for Wildland fire. At the writing of this plan it is unknown if any of those roads are marked on any maps in the park or on the Wildland Engines.

Trails

Many possibilities exist for using existing trails as control lines. Refer to the sets of topographic maps in Park Dispatch or on Engines 3 and 4. Most trails will need to be prepped by removing vegetation to prevent further spread of the fire.

`

Other Considerations

In some areas the sparse nature of the vegetation could be used as a control line.

`

Natural Barriers

In lower elevations the sparse and discontinuous nature of the fuels would be a natural barrier. Arroyos could also be considered natural barriers depending on fire behavior and flame length.

In mountainous areas there are numerous large cliff formations that could be used as natural barriers depending on fire behavior and flame lengths. Refer to maps in Park Dispatch or engines 3 and 4.

Safety Zones

In the Chisos Basin Evacuation Plan there are two safety zones in the Chisos Developed area. Refer to that plan for their location.

In the higher elevations accessible by foot there are a few safety zones that could accommodate some firefighters. It needs to be determined exactly how many individuals these safety zones could accommodate. Most potential safety zones would need to be burned out before being used.

Juniper Flats and Boulder Meadows areas along the established trails are options.

The Western end of the South Rim could be used where ground fuels are very sparse.

`

The South Rim at the end of the Boot Canyon Trail is a possibility where the trees are very spread out and savannah like. This area would need to burn out for use.

Other areas may exist. They will need evaluations before determination.

Staging Area Locations

An excellent candidate for staging area is the Emergency Services Building (ESB). There is plenty of parking for Engines and Crew Buses. The Fire Cache is nearby and a fire hydrant for filling engines is just on the northwest side of the building. Restrooms and potable water are available.

Another good candidate is behind the Ranger Station/Visitor Center in the Chisos Basin. This area provides more limited parking than the ESB but still offers plenty of room for multiple resources. Restrooms and potable water are available. Fire Hydrants are nearby.

Depending on the location of the incident or Initial Attack needs campgrounds could also be used as staging areas.

`

Planning

Park Base Map and Topographic Maps

Complete sets of USGS (1:24,000 scale) topographic maps of the park can be found in Park Dispatch, and Engines 3 and 4.

Infrared Image

Order an Infrared Flight through Lincoln Zone Coordination Center.

Vegetation and Fuels maps

(Betty Alex will print for final product)

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Hazard Locations (Ground and Aerial)

Aviation hazard map is in District Rangers Office at Panther Junction.

Numerous hazards exist in all developed areas. Overhead power lines and buried power lines are common.

Propane tanks are common in Developed areas. Underground propane lines are also common in developed areas.

In mountainous areas terrain is often an extreme hazard. Watch footing and flag dangerous areas.

Several Military Flight Paths exist in the Park.

Archeological/Cultural Base Maps

Please refer to Science and Resource Management Staff for assistance on location of archeological and historical resources.

Archeologist Tom Alex	477-1144
Geologist Don Corrick	477-1142
GIS Specialist Betty Alex	477-1146

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Endangered Species critical Habitat

Please contact Science and Resource Management Staff for habitat location.

Wildlife Biologist Raymond Skiles 477 1145
GIS Specialist Betty Alex 477 1146

A map is available for Black Cap Vireo habitat locations. A map is also available for location of Agave species that serve as a food source for the Mexican Long Nose Bat.

Sensitive Plant Populations

Contact Joe Sirotnak, Park Botanist. 477 1148
GIS Specialist Betty Alex 477 1146

Land Status

Nehr property - accessible in-holding south of the Harte Ranch road. Small RV trailer on site.

The Pitcock-Rosillos Ranch is surrounded on three sides by National Park. It is in the central northern portion of the park. The ranch has multiple buildings and structures.

`

The northwest boundary of the park has been under dispute over the past few years. The status of that situation is not known at this time.

`

Appendix H -1: Long-Term Prescribed Fire and Hazard Fuel Reduction Plan

Vegetation types: R=floodplain/riparian; DS = desert scrub; HDG = high desert grasslands; SW= shrub woodlands; GW= grassy woodlands; F= forest

Year/ month	Project name	Acres	Condition Class	Vegetation type	Purpose of treatment and monitoring objectives
2005	1314 Junction	531	II	HDG	Reduce hazard fuels and improve egress from Basin exit. *Monitor* exotic plant species, shrub density, grass cover, species diversity, vegetation structure, recovery rates, agave mortality
2005	Boquillas Cyn Trailhead	10	III	R	Ecological restoration, fuel reduction, reduce saltcedar, exotics *Monitor* shrub density, grass cover, species diversity, vegetation structure, recovery rates, and non- native cover; cultural resources
2005	Panther Junction Blocks BC	29	II	HDG	Reduce hazard fuels *Monitor* shrub density, grass cover, species diversity, vegetation structure, recovery rates, and non- native cover
2006	Panther Junction Blocks EF- 2nd entry	55	II	HDG	Reduce hazard fuels, defensible space *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, rate of recovery, nonnative cover
2006	Tobosa Grass Research Burn	10	II	DS	Research determine fire's role in restoring/ maintaining grasslands *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, recovery rates. Erosion rates. Percent grass recovering by seed & rhizome, soils erosion. Cultural resources
2006	Chisos Basin Blocks BCP	22	II	GW	Reduce hazard fuels, defensible space *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, nonnative cover, agave mortality
2006	SE Rim	370	II	GW/F	Reduce hazard fuels, retain species diversity, vegetation structure, reduce fuels, shrubs, uneven age stands *Monitor* dead and downed, tree density by size class, foliar and basal cover of herbaceous and woody species and surface cover

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Year/ month	Project name	Acres	Condition Class	Vegetation type	Purpose of treatment and monitoring objectives
2006	Santa Elena Canyon Overlook	180	III	R	Ecological restoration, fuel reduction, reduce saltcedar, exotics *Monitor* shrub density, grass cover, species diversity, vegetation structure, recovery rates, and non- native cover; cultural resources
2006	Sublett Farm Floodplain- 1st entry	415	III	R	Ecological restoration, cultural restoration *Monitor* shrub density, grass cover, species diversity, vegetation structure, recovery rates, and non- native cover; cultural resources
2006	SW Rim Line Prep	26	I	GW/F	Reduce hazard fuels, maintain species diversity *Monitor* dead and downed fuels, tree density by size class, foliar and basal cover of herbaceous and woody species and surface cover. Monitor sensitive species
2007	Basin Campground Blocks FHKLMNO	67	II	SW	Reduce hazard fuels & create safety zone *Monitor* shrub density, grass cover, species diversity, vegetation structure, recovery rates, agave mortality and non- native cover
2007	Basin Block DEG	70	I	SW/GW	Reduce hazard fuels & create safety zone *Monitor* shrub density, grass cover, species diversity, recovery rates, agave mortality and non- native cover
2007	Alberico – Moir Long- term monitoring plots.	2.5	II/III	HDG/SW/GW/F	Reduce hazard fuels, assess first entry burns; a 2nd entry burn *Monitor* dead and downed fuels, tree density by size class, shrub density, foliar and basal cover of herbaceous and woody species, and surface cover
2007	RGV Campground	10	III	R	Reduce hazard fuels, removal of exotics, defensible space *Monitor* shrub density, grass cover, species diversity, vegetation structure, recovery rates, and non- native cover
2007	Gambusia pond	6	III	R	Wetland restoration *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, recovery rates, non- native cover
2007	Tamarisk thickets	3 x 20	III	R	Ecological restoration, removal of exotics *Monitor* tree density by size class, shrub density, foliar and basal cover of herbaceous and woody species, surface cover
2007	SW Rim Rx Burn	170	II	GW/F	Reduce hazard fuels, retain species diversity, vegetation structure, reduce fuels, shrubs, uneven age stands *Monitor* dead and downed, tree density by size class, foliar and basal cover of herbaceous and woody species and surface cover

`

Year/ month	Project name	Acres	Condition Class	Vegetation type	Purpose of treatment and monitoring objectives
2007	Green Gulch Mech Reduction A	8	II	HDG/SW	Reduce hazard fuels *Monitor* tree density by size class, shrub density, foliar and basal cover of herbaceous and woody species, surface cover. Cultural resources
2008	Johnson grass-Harte ranch	2	III	DS	Research fire & exotic species control *Monitor* % kill/recovery of exotic following fire + herbicide treatment, Shrub density, grass & shrub basal and foliar cover, species diversity. Cultural resources
2008	Buffelgrass – Johnson Ranch Road	2	III	DS	Research fire & exotic species control *Monitor* % kill/recovery following fire + herbicide treatment; shrub density, grass & shrub basal and foliar cover, species diversity, non- native cover. Cultural resources.
2008	Homer Wilson Ranch site	2	II/III	DS/HDG	Reduce hazard fuels *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, recovery rates, non- native cover
2008	Hannold Draw 2nd entry	484	II	DS	Reduce hazard fuels *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, recovery rates, non- native cover. Cultural resources
2008	Basin Blocks AIJ	13.5	II	SW	Reduce hazard fuels, improve defensible space *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, rate of recovery, nonnative cover
2008	PJ Blocks GHI	9	II	HDG	Reduce hazard fuels *Monitor* shrub density, grass cover, species diversity, vegetation structure, recovery rates, and non- native cover
2008	G. fescue micro burns	0.1	II	SW/GW/F	Fuels reduction; Research Guadalupe Fescue establishment *Monitor* fire effects on species, species diversity, Guadalupe fescue vegetative and reproductive response. Tree density by size class, shrub density, foliar and basal cover of herbaceous and woody species, surface cover
2008	Panther Junction Block D	52	II	HDG	Reduce hazard fuels *Monitor* Shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, non- native cover

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Year/ month	Project name	Acres	Condition Class	Vegetation type	Purpose of treatment and monitoring objectives
2008	North Boundary or North Windmill (Chalk Draw)	200	II	DS	Reduce hazard fuels *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, non- native cover. Cultural resources
2008	Green Gulch corridor Mech Reduction B	8	II	HDG/SW	Reduce hazard fuels *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, nonnative cover, agave mortality. Cultural resources
2009	Basin (Sewer Lagoon to Panther Pass)	240	II	SW	Reduce hazard fuels in high use corridor. *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, rate of recovery, no- native cover, agave mortality, Cultural resources
2009	Johnson grass-Harte Ranch	2	III	DS	Research grasslands response to fire *Monitor* % kill/recovery of exotic following fire + herbicide treatment, Shrub density, grass & shrub basal and foliar cover, species diversity
2009	Buffelgrass-Johnson Ranch Road	2	III	DS	Research grasslands response to fire *Monitor* Percent kill/recovery of exotic following fire + herbicide treatment, Shrub density, grass & shrub basal and foliar cover, species diversity
2009	Homer Wilson Shearing Pen	1	III?	DS	Reduce hazard fuels *Monitor* Shrub density, grass & shrub basal and foliar cover, species diversity, recovery rates, non- native cover
2009	Lone Mountain 2nd entry	640	II	DS/HDG	Reduce hazard fuels *Monitor* Shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, non- native cover
2009	Dick- Peddie Plot 4/ Boot Canyon	0.1 acres	II	F	Research burn *Monitor* tree density by size class, shrub density, foliar and basal cover of herbaceous and woody species and surface cover. Cultural resources
2010	Basin Block BP	13	II	GW	Reduce hazard fuels *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, nonnative cover, agave mortality

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Year/ month	Project name	Acres	Condition Class	Vegetation type	Purpose of treatment and monitoring objectives
2010	Panther Junction Block A	56	II	HDG	Reduce hazard fuels *Monitor* Shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, non- native expansion/invasion.
2010	Green Gulch West	200	II	HDG/SW	Reduce hazard fuels *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, non- native cover, agave mortality
2010	RGV/Boquillas Overlook	10	III	R	Reduce hazard fuels/control exotic species *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, non- native cover
2010	Green Gulch corridor Mech Reduction C	8	II	HDG/SW	Reduce hazard fuels *Monitor* Shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, non- native cover, agave mortality. Cultural resources
2010	RGV- Gambusia Wetland 2nd entry	10	I	R	Reduce hazard fuels *Monitor* photo points to observe changes in vegetation structure
2011	Green Gulch corridor Mech Reduction D	8	II	HDG/SW	Reduce hazard fuels *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, non- native cover, agave mortality. Cultural resources
2011	Toll Mountain	?	II	F/GW	Research burn – intensity effects *Monitor* tree density by size class, shrub density, foliar and basal cover of herbaceous and woody species and surface cover. Cultural resources
2011	Maple Canyon Basin	?	II	GW/SW	Reduce hazard fuels *Monitor t*ree density by size class, shrub density, foliar and basal cover of herbaceous and woody species and surface cover, agave mortality. Cultural resources
2011	Gambusia pond- 2nd entry	6	I	R	Wetland restoration *Monitor* recovery of natives including seedling establishment, pond flows and water table levels when possible. Cultural resources
2012	SE Canyon Overlook- 2nd entry	174	III	R	Ecological restoration, control exotic species *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, non- native cover

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Year/ month	Project name	Acres	Condition Class	Vegetation type	Purpose of treatment and monitoring objectives
2012	Sublett Farm Floodplains-2nd entry	415	III	R	Ecological restoration, cultural resource site, control exotics *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, non-native cover
2012	RGV Campground East	18	III	R	Reduce hazard fuels *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, non-native cover
2013	Casa Grande-2nd entry	230	I	GW/SW	Reduce hazard fuels *Monitor* tree density by size class, shrub density, foliar and basal cover of herbaceous and woody species, surface cover, agave mortality
2013	Basin Campground	70	II	GW/SW	Reduce hazard fuels *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, non-native cover, agave mortality
2013	Basin Block DEG	70	II	GW/SW	Reduce hazard fuels *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, non-native cover, age mortality
2013	Panther Junction Blocks BC-2nd entry	9	II	HDG	Reduce hazard fuels *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, non-native cover
2013	SE Rim-2nd entry	370	II	GW/F	Reduce hazard fuels, maintain species diversity *Monitor* tree density by size class, shrub density, foliar and basal cover of herbaceous and woody species and surface cover
2014	RGV Campground – 2nd entry	10	III	R	Reduce hazard fuels, control exotics, create defensible space *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, non-native cover

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Year/ month	Project name	Acres	Condition Class	Vegetation type	Purpose of treatment and monitoring objectives
2014	Basin Blocks BCP	22	II	GW	Reduce hazard fuels, maintain defensible space *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, non-native cover, age mortality
2014	Panther Junction Blocks EF- 3rd entry	55	II	HDG	Reduce hazard fuels, maintain defensible space *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, non-native cover
2014	1314 Junction 2ND Entry Burn	531	II	HDG	Reduce hazard fuels *Monitor* shrub density, grass & shrub basal and foliar cover, species diversity, vegetation structure, recovery rates, non-native cover, age mortality
	TOTAL ACRES	**5984.2**			

While prescribed burns are often planned a year ahead, the availability of funding, weather, equipment and staff, determine when the burn can be conducted safely.

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Appendix H-2: EXAMPLE PRESCRIBED BURN PLAN

From RM-18, Chapter 10 (January, 2005)

Prescribed Fire Project Plan Contents: A standard prescribed fire plan form has been developed for use in the National Park Service. However, due to the variety of information required by an individual park unit the plan may be supplemented with additional content provided the minimum elements listed in the standard form are addressed. Each plan **shall include** as a minimum, the following elements:

Signature Page: The approved prescribed fire plan constitutes a delegation of authority to burn. No one has the authority to burn without an approved plan or in a manner not in compliance with the approved plan. Actions taken in compliance with the approved prescribed fire plan will be fully supported. Personnel will be held accountable for actions taken that are not in compliance with elements of the approved plan regarding execution in a safe and cost-effective manner.

Executive Summary: A brief discussion describing the purpose and justification of the project, connection with the overall management of the unit, and description of how it implements the fire management plan.

Description of Prescribed Fire Area:
General Area Description (narrative)
Location (County, Legal, Lat/Long and/or UTM, Fire Management Zone)
Geographic Attributes (Project Size, Elevation Range, Slope, Aspect)
Description of Project Boundaries (Define geographic, natural and human features to be used as the project boundary.)
Vegetation Types: Described the structure and composition of the vegetation type(s) within the project area, the percent of the area composed of this type and the fuel model that corresponds to it. Include plant community class, as available.
Fuels Characteristics: Described fuels as applicable by fuel type. Describe: Fuel type, natural or activity; Fuel Loadings by size class, live and dead, and total; Fuel bed depth; Arrangement; and discussion of past environmental effects on the land and how they have impacted the fuel characteristics as appropriate.
Vicinity Maps – attached as appendices
Project Maps – attached as appendices (include vegetation/fuel maps)

Goals and Objectives: Include purpose and goals of the prescribed fire, as stated in park management and supporting management plans (i.e. Resource Management Plan, Cultural Landscape Plan, Endangered Species Recovery Plan, etc.) Specific objectives of the prescribed fire and protection objectives shall be stated in quantifiable and measurable terms.

Risk Management: The process of identifying and controlling hazards to protect resources and property. This includes implementing a risk management process, which is an analysis of proposed actions, the environment (fuels, topography, weather, etc.) where the project takes place, assessment of

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hazards, potential consequences, and mitigation to reduce risk (see Exhibit 2, Hazard Rating Guide; Exhibit 3, Prescribed Fire Risk Analysis Worksheet; and Exhibit 4, Risk – Assessment Matrix). Mitigations to reduce risk are outlined in the Prescribed Fire Risk Mitigation Table, Exhibit 5. The mitigations described are then addressed in the later sections of the prescribed fire plan dealing with project complexity, organization, pre-burn considerations, ignition and holding actions, public and firefighter safety, and monitoring.

A Job Hazard Analysis (JHA), Exhibit 14, is part of this procedure and helps to integrate acceptable safety and health principles into the operation within the Humans Factors element of the Prescribed Fire Risk Analysis Worksheet.

Project Complexity: A prescribed fire complexity rating shall be completed as part of each prescribed fire plan following the process in Exhibits 6 and 7 (Exhibit 6, Prescribed Fire Complexity Rating Worksheet and Exhibit 7, Complexity Value Guide). This process determines the level of organizational structure and support needed to implement the project based on operational, logistical, safety and management needs. The complexity value breakpoints for requiring a Prescribed Fire Burn Boss Type 1 shall be 4 or more Complexity Values rated "High" OR 2 or more of the Primary Factor Complexity Values rated "High" OR when deemed appropriate by the agency administrator or unit Fire Management Officer.

Organization: List required project organization to complete all phases of the project execution. The prescribed fire organization should be developed based on the objectives, risk assessment and project complexity. Specify **minimum** number and type of resources needed. Consider long duration, day/night, and multi-operational period projects where exchange of resources will need to occur.

Cost: Estimated total costs for all phases of the project.

Scheduling: Include proposed ignition date, projected duration. Note any dates when project may not be conducted.

Preburn Considerations: List key on and offsite preburn activities and special precautions and regulations including responsibilities and timeframes. Specify on-site: line to be built, snags to be felled or protected, equipment to be prepositioned, special features to be protected, warning signs to be placed, weather recording and monitoring needs, etc. Specify off-site: burn permits, notifications, media releases, closures, etc. Notifications will show whom we want to contact, who was contacted, who made the contact and when the contact was made. Specify special precautions and regulations: air quality, endangered species, cultural clearances, etc.

Prescription: A prescribed fire prescription contains key weather and fire behavior parameters needed to achieve desired results. Identify ranges of acceptable prescription parameters to obtain desired fire behavior and effects. Attach modeling outputs to justify prescription.

Ignition and Holding Actions: Identify methods, roles and responsibilities,

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coordination and special considerations needed. Attach modeling outputs or worksheets (i.e. Fireline Handbook, BEHAVE, etc.) to justify minimum holding resources required. An Incident Action Plan (IAP) is developed for each operational period that defines tactical activities and assignments.

Test Fire: The test fire is intended to evaluate fire behavior characteristics that are necessary to meet the prescribed fire plan objectives. A test fire is completed prior to making the decision to execute the project. It shall be ignited at a location within the prescribed fire area that is representative of the site and in an area that can be easily controlled if fire behavior is unacceptable.

Firing and Ignition: Describe ignition operations including firing techniques and patterns. (attach a map where applicable.) Firing and ignition patterns should address potential changes to weather, topography and fuels. Specific firing and ignition tactics will be documented in the IAP showing necessary resources, safety considerations, equipment, and supplies. These tactics shall be further clarified in the briefing.

Holding Actions: Operations to safely maintain the prescribed fire within prescription, within project boundaries and control all slopovers and spot fires within a predetermined time and size. Consider long duration, day/night, multi-operational period projects where exchange of resources will need to occur.

Critical Holding Areas: Identify those areas where there is a higher likelihood of holding problems along the boundary or outside the burn unit (anticipated locations of numerous spot fires and/or slopovers, changes in fuel type, high value resource near the project boundary, etc.).
Divide the Project Area into subunits such as Branches, Divisions, and Groups, based upon complexity, size, assignments, access, topography, etc. Clearly delineate these on the project map using Incident Command System (ICS) symbols.

Mop-up Operations: Identify proposed actions to secure and patrol project area until the prescribed fire is declared out.

Wildland Fire Transition Plan: Identify actions and notifications needed when the prescribed fire exceeds project boundaries and cannot be controlled within one burning period using on-site holding resources. All further actions will be determined through a new strategy developed in the Wildland Fire Situation Analysis (WFSA) process. Identify who the initial incident commander will be and what notifications will be needed.

Protection of Sensitive Features: Identify treatment and mitigations needed to protect cultural sites, threatened and endangered species, or other sensitive features. Include compliance with all applicable NEPA and NHPA requirements.

Public and Firefighter Safety: Describe public and personnel safety and emergency procedures. Identify safety hazards in and outside the project area, measures taken to reduce or mitigate those hazards, and Emergency Medical Service personnel assigned. The IAP should address communications, medical plan, and incident safety analysis.

Smoke Management: Describe how the project will comply with County, State,

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Tribal, and Federal air quality regulations. Include modeling outputs and mitigation measures to reduce potential impacts of smoke production and smoke related safety and health issues, if required.

Interagency Coordination and Public Information: Identify actions, timelines and responsibilities for interagency and intra-agency pre-burn coordination and public involvement.

Media Releases and Public Notice Postings.

Notifications: List of appropriate individuals, agencies and the public to receive notifications.

Monitoring: Describe how the following two elements will be met:
Fire Behavior Monitoring – specify how monitoring of prescription elements will take place pre-ignition and during the burn, including weather, smoke/air quality, and fire behavior observations. Specify on-site weather, smoke, and fire behavior observations required during all phases of the project. Include procedures and responsibilities for acquiring weather and smoke forecasts. May reference park Fire Monitoring Plan, or recommended standards for Level 1 and/or Level 2 fire monitoring guidelines in the NPS Fire Monitoring Handbook.
Fire Effects Monitoring – specify how long and short-term fire effects (vegetation and fuels) monitoring will take place pre-burn and post-burn to evaluate if project objectives have been met. May reference park Fire Monitoring Plan, or recommended standards for Level 3 and/or Level 4 fire monitoring guidelines in the NPS Fire Monitoring Handbook. If plots exist on the unit, include a map of plot locations.
Chapter 11 contains an outline for completing a Fire Monitoring Plan.

Post Fire Rehabilitation: Describe any necessary rehabilitation of disturbances that will be undertaken resulting from management activities of the project. These typically include fireline restoration, minor fence repairs and other mitigation actions that are pre-identified in the prescribed fire plan.
Post Fire Reports: Identify who, what and when various reports associated with this project will be completed.

Appendices: Items to be attached to the prescribed fire plan:
Reviewer Comments - Provides a space for each reviewer to document comments pertaining to the development of the prescribed fire plan.
Technical Reviewer Checklist and Comments
Maps
Prescribed Fire Complexity Rating Worksheet
1) *Periodic Re-Validation Table for multiple operational period burns*
2) *Hazard Rating Guide, Prescribed Fire Risk Analysis Worksheet, and Prescribed Fire Risk Mitigation Table,*
Fire Modeling Outputs
Agency Administrator Go/No-Go Pre-Ignition Approval
Prescribed Fire Operations Go/No-Go Checklist

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Appendix I: Fire Prevention Plan

FP ZONE # 1 CHISOS BASIN

HAZARD

HIGH	Flashy fuels on steep slopes are continuous. Improvements constructed on mid-slope. One way ingress and egress.

VALUE

HIGH	Concession lodge, restaurant, gift shop, Remuda Dorm Housing and Mule Corrals, campground with structures, NPS and Concession housing.

RISK

HIGH	Significant historical fire occurrence from lightning and human causes (campground, trails, etc.)

PREVENTION ACTIONS REQUIRED:	RESPONSIBLE PERSON(S)
1. Include fire prevention message in backcountry permit and handouts.	Chief, Interpretation and Visitor Services
2. Include fire prevention message in campground bulletin boards and evening programs, with specific warnings and restrictions when high to extreme ratings are reached.	Chief, Interpretation and Visitor Services
4. Ranger patrols will enforce emergency restrictions.	Chief, Visitor and Resource Protection
5. Inspect all government and concession facilities for compliance with fuel abatement guideline.	Fire Management Officer Chief, Visitor and Resource Protection
8. Hold periodic meetings with residents to discuss issues and provide background and procedures on Chisos Evacuation Plan	Fire Management Officer
9. Conduct cyclic management ignited prescribed burns to manage fuel load	Fire Management Officer

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10. Consider sep-up of sprinkler systems around campground and housing area during high to extreme fire danger .	Fire Management Officer
11. Fire Management Staff will conduct periodic Patrols through developed area to ensure restrictions are being met. Include fire prevention message targeting wood or ground fires and general caution with all heat sources.	Fire Management Officer
12. Broadcast Fire Danger Rating and Restrictions over the Radio. Post Fire Danger Rating on Daily Report	Park Dispatch
13. Enforce restrictions during high to extreme fire danger periods through Fire Management Staff patrol.	Fire Management Officer

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FP ZONE #2 PANTHER JUNCTION

HAZARDS

HIGH	Sparse desert shrubs with fingers of flashy fuels throughout area.

VALUE

HIGH	Park Visitor Center and Headquarters complex, maintenance buildings, school, employee housing.

RISK

HIGH	High historical lightning fire occurrence; human risks associated with congested activities (cooking, vehicle, recreational activities, etc.).

PREVENTION ACTIONS REQUIRED:		RESPONSIBLE PERSON(S)
1.	Display visitor center fire prevention message, including WFU and management ignited prescribed burn rationale. Display Fire Danger Ratings and Restrictions.	Chief, Interpretation and Visitor Services
3.	Include fire prevention message in backcountry permit and handouts.	Chief, Interpretation and Visitor Services
4.	Strengthen and enforce guidelines for fuel reduction around residences.	Fire Management Officer
5.	Inspect hazard fuels around structures.	Fire Management Officer
6.	Conduct cyclic management ignited prescribed burn program to reduce fuel in housing area.	Fire Management Officer
7	Broadcast Fire Danger rating/restrictions over park radio. Post Fire Danger Rating on Daily Report.	Park Dispatch

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FP ZONE #3 BLUE CREEK RANCH

HAZARD

MODERATE Sparse desert shrubs with fingers of flashy fuels through area.

VALUE

HIGH Historic structures (stone) with wooden corrals.

RISK

LOW Few historic fires in area, moderate human cause potential as ranch is on access route to Castolon area.

PREVENTION ACTIONS REQUIRED:		RESPONSIBLE PERSON(S)
1.	Fire Management Staff will conduct prevention and detections patrols. Public Contact will include prevention message and/or WFU/prescribed fire rationale.	Fire Management Officer and Supervisory Forestry Tech
2.	Reduce fuels around base of corral posts.	Fire Management Cultural Resource
3.	Broadcast Fire Danger rating/restrictions over park radio. Post Fire Danger Rating on Daily Report.	Park Dispatch
4.	Ranger patrols will enforce emergency restrictions.	Chief, Visitor and Resource Protection
5.	Enforce restrictions during high to extreme fire danger periods through Fire Management Staff patrol.	Fire Management Officer

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FP ZONE #4 RIO GRANDE VILLAGE

HAZARD

LOW/MODERATE	Fires along the river are generally contained by natural barriers and are generally less flammable around structures.

VALUE

HIGH	Visitor Contact Station, campground, government housing, concession store and gas station

RISK

HIGH	Significant historical fire occurrence heavy visitor use.

PREVENTION ACTIONS REQUIRED:	RESPONSIBLE PERSON(S)
1. Include fire prevention message targeting smoking and cooking activities along the river in backcountry permits and handouts.	Chief, Interpretation and Visitor Services
2. Enforce restrictions during high to extreme fire danger periods through Fire Management Staff patrol.	Fire Management Officer
3. Inspect hazardous fuel reduction around all concession and government facilities annually.	Fire Management Officer
4. Broadcast Fire Danger rating/restrictions over park radio. Post Fire Danger Rating on Daily Report.	Park Dispatch
5. Fire Management Staff will conduct prevention and detection patrols. Public Contact will include prevention message and/or WFU/prescribed fire rationale.	Fire Management Officer and Supervisory Forestry Tech
6. Ranger patrols, will enforce emergency restrictions.	Chief, Visitor and Resource Protection
7. Enforce restrictions during high to extreme fire danger periods through Fire Management Staff patrol.	Fire Management Officer

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FP ZONE #5 CASTOLON

HAZARD

LOW	Wildfires along the river are generally contained by natural barriers; general area has low fuel loads.

VALUE

HIGH	Visitor Contact Station, campground, government housing, concession store and gas station

RISK

LOW	Few historical fires, human risks associated with congested recreational activities.

PREVENTION ACTIONS REQUIRED:	RESPONSIBLE PERSON(S)
1. Include fire prevention message targeting smoking and cooking activities along the river in backcountry permits and handouts. Post fire danger warnings and restrictions.	Chief, Interpretation and Visitor Services
2. Inspect hazardous fuel reduction around all concession and government facilities annually.	Fire Management Officer
3. Broadcast Fire Danger rating/restrictions over park radio. Post Fire Danger Rating on Daily Report.	Park Dispatch
4. Fire Management Staff will conduct prevention and detections patrols. Public Contact will include prevention message and/or WFU/prescribed fire rationale	Fire Management Officer and Supervisory Forestry Tech
5. Ranger patrols, will enforce emergency restrictions.	Chief, Visitor and Resource Protection

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FP ZONE #6 CHISOS MOUNTAINS

HAZARDS

HIGH	Flashy fine fuels at lower elevations blend into pinyon pine on steep slopes.

VALUES

LOW	Minimal interpretive and trail improvements.

RISKS

LOW to MODERATE	Significant historical wildfire record associated with lightning and human activity on trail system.

PREVENTION ACTIONS REQUIRED:		RESPONSIBLE PERSON(S)
1.	Advise backcountry users of fire danger warnings and restrictions, and proper smoking and cooking procedures.	Chief, Interpretation and Visitor Services
2.	Equip backcountry patrols for initial attack during high to extreme fire danger. Include Fire Prevention Message WFU/prescribed fire rational during Public Contact	Chief, Visitor and Resource Protection
3.	Broadcast Fire Danger rating/restrictions over park radio. Post Fire Danger Rating on Daily Report.	Park Dispatch
4.	Fire Management Staff will conduct prevention and detections patrols. Public Contact will include prevention message and/or WFU/prescribed fire rationale.	Fire Management Officer and Supervisory Forestry Tech
5.	Ranger patrols, will enforce emergency restrictions.	Chief, Visitor and Resource Protection
6.	Enforce restrictions during high to extreme fire danger periods through Fire Management Staff patrol.	Fire Management Officer

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FP ZONE #7 RIO GRANDE RIVER

HAZARDS

LOW to MODERATE	Fires along the river edge are generally contained by natural barriers.

VALUES

LOW to HIGH	Numerous historic ranches (structures) along river corridor.

RISKS

LOW to MODERATE	Numerous incendiary and accidental ignitions associated with river travel.

PREVENTION ACTIONS REQUIRED:	RESPONSIBLE PERSON(S)
1. Advise river users of proper smoking and cooking procedures.	Chief, Interpretation and Visitor Services
2. Broadcast Fire Danger rating/restrictions over park radio. Post Fire Danger Rating on Daily Report.	Park Dispatch
3. Fire Management Staff will conduct prevention and detections patrols. Public Contact will include prevention message and/or WFU/prescribed fire rationale.	Fire Management Officer and Supervisory Forestry Tech
4. Ranger patrols, will enforce emergency restrictions.	Chief, Visitor and Resource Protection
5. Enforce restrictions during high to extreme fire danger periods through Fire Management Staff patrol.	Fire Management Officer

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FP ZONE #8 PERSIMMON GAP

HAZARDS

LOW to MODERATE	Desert shrub fuels occasionally support an intense wind-driven fire.

VALUES

MODERATE	Visitor Contact Station, government housing

RISKS

MODERATE	Low historic fire occurrence, major access route for park.

PREVENTION ACTIONS REQUIRED:	RESPONSIBLE PERSON(S)
1. Construct and install fire danger sign on roadside.	Chief, Facility Management
2. Post fire prevention message (targeting roadside fires) on bulletin board, and include rational for WFU and management ignited prescribed burns.	Chief, Interpretation and Visitor Services
3. Inspect fuel reduction program around all facilities.	Fire Management Officer
4. Broadcast Fire Danger rating/restrictions over park radio. Post Fire Danger Rating on Daily Report.	Park Dispatch
5. Fire Management Staff will conduct prevention and detections patrols. Public Contact will include prevention message and/or WFU/prescribed fire rationale.	Fire Management Officer and Supervisory Forestry Tech
4. Ranger patrols, will enforce emergency restrictions.	Chief, Visitor and Resource Protection
5. Enforce restrictions during high to extreme fire danger periods through Fire Management Staff patrol.	Fire Management Officer

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FP ZONE #9 HARTE RANCH

HAZARD

LOW to MODERATE	Sparse desert fuels at Airport Lodge and Ranch Complex. Creosote shrub with some fine fuels at Mountain Lodge.

VALUE

MODERATE	Mountain Lodge, Airport Lodge, Harte Ranch headquarters complex.

RISK

LOW	Few historical fires, low public visitation, some use by researchers.

PREVENTIONS ACTIONS REQUIRED:		RESPONSIBLE PERSON(S)
1.	Clear fuels from around structures.	Fire Management Officer
2.	Broadcast Fire Danger rating/restrictions over park radio. Post Fire Danger Rating on Daily Report.	Park Dispatch
3.	Fire Management Staff will conduct prevention and detections patrols. Public Contact will include prevention message and/or WFU/prescribed fire rationale.	Fire Management Officer and Supervisory Forestry Tech
4	Ranger patrols, will enforce emergency restrictions.	Chief, Visitor and Resource Protection
5.	Enforce restrictions during high to extreme fire danger periods through Fire Management Staff patrol.	Fire Management Officer

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FP ZONE #10 GENERAL BACKCOUNTRY

HAZARDS

LOW to MODERATE	Desert shrub fuels are broken up by natural barriers; fire must be driven by steady winds to reach significant size.

VALUES

LOW	Numerous roadside exhibits, campsites, trails, and scientific equipment. Numerous archeological sites may be damaged by suppression actions.

RISKS

LOW to MODERATE	Numerous historical lightning fires and occasional human ignitions (vehicle accidents, camping, smoking).

PREVENTION ACTIONS REQUIRED:	RESPONSIBLE PERSON(S)
1. Ranger patrol vehicles to carry initial attack gear during high to extreme fire danger.	Chief of Visitor and Resource Protection
2. Survey dry thunderstorm paths (with lightning) for new fires.	Fire Management Officer
3. Broadcast Fire Danger rating/restrictions over park radio. Post Fire Danger Rating on Daily Report	Park Dispatch
4. Fire Management Staff will conduct prevention and detections patrols. Public Contact will include prevention message and/or WFU/prescribed fire rationale	Fire Management Officer and Supervisory Forestry Tech
5. .Ranger patrols, will enforce emergency restrictions.	Chief, Visitor and Resource Protection
6. Equip backcountry patrols for initial attack during high to extreme fire danger. Include Fire Prevention Message WFU/prescribed fire rational during Public Contact.	Chief, Visitor and Resource Protection

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Appendix J: Weather Station Catalogues

Weather Station Inventory for 417401

Station: 417401 Name: PANTHER JUNCTION NESDIS: FA63D150

Type: 4 (RAWS S NFDRS) Create/Mod Date: 15-Dec-2004 Obs Time/Z: 13/CST
Assoc Man: _____ Prev Stn: _____ Fcst Zone: ____

State: 48-TX County: 43-_____Lat/Lon: 29 19 39, 103 12 27
Obs Agy: 3 (USDI NPS) Unit: BIBE Mnemonic: BIBE FS Reg: 3

Fuel Stk: _____ Wdy FM Mea: _____
Site: 1 Elev: 3750 Asp: 8 Ann Prec: 14.50 Season:
Ltng scale: 1.00 Hum code: 2 Temp code: 1 Pres code: 1
Wind Spd code: 1 KBDI: 275 One/Ten Fl: N

User: NPS7131 Acc Lst: BIBE
Comments: LAT AND LONG ON NAD 83

P	** 78 NFDRS Only **				88	S	G	C	Staffing Idx Breakpnts					
r		H		Greenup	S	l	r	l			Low		High	
i	FM	S	Herb Date	Date	b	p	s	i	SI	DC	SI%	Val	SI%	Val
-	--	-	---------	---------	-	-	-	-	--	--	---	---	---	---
1	7L	C	12-nov-04	28-mar-04	_	1	P	1	BI	5	90	53	97	67
2	7T	C	12-nov-04	28-mar-04	_	1	P	1	BI	5	90	71	97	94
3	7G	C	12-nov-04	28-mar-04	_	1	P	1	EC	5	90	72	97	83

NESDIS	S#	Description	SHEF
FA63D150	9	RAIN ACCUMULATION, INCHES	PC
FA63D150	10	WINDSPEED, MILES PER HOUR	US
FA63D150	11	WIND DIRECTION, DEGREES	UD
FA63D150	12	AIR TEMPERATURE, DEGREES F., STANDARD PL	TA
FA63D150	13	FUEL TEMPERATURE, DEGREES F.	MT
FA63D150	14	RELATIVE HUMIDITY, PERCENT	XR
FA63D150	15	BATTERY VOLTAGE, VOLTS	VB
FA63D150	17	FUEL MOISTURE, PERCENTAGE	MM
FA63D150	18	WIND DIRECTION, DEGREES, PEAK	UX
FA63D150	19	WINDSPEED, MILES PER HOUR, PEAK	UP
FA63D150	20	SOLAR RADIATION, WATTS	RD

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Weather Station Inventory for 417403

Station: 417403 Name: CHISOS NESDIS: FA635744

Type: 4 (RAWS S NFDRS) Create/Mod Date: 05-Dec-2004 Obs Time/Z: 13/CST
Assoc Man: _____ Prev Stn: _____ Fcst Zone: 803

State: 48-TX County: 43-_____Lat/Lon: 29 16 15, 103 17 57
Obs Agy: 3 (USDI NPS) Unit: BIBE Mnemonic: BIBE FS Reg: 3

Fuel Stk: _____ Wdy FM Mea: _____
Site: 2 Elev: 5400 Asp: 0 Ann Prec: 18.50 Season:
Ltng scale: 1.00 Hum code: 2 Temp code: 1 Pres code: 1
Wind Spd code: 1 KBDI: 275 One/Ten Fl: N

User: NPS7131 Acc Lst: BIBE
Comments:

P r i	FM	H S	Herb Date	** 78 NFDRS Only ** Greenup Date	88 S b	S l p	G r s	C l i	Staffing Idx Breakpnts SI	DC	Low SI%	Low Val	High SI%	High Val
1	7L	C	15-apr-04	04-apr-04	_	4	P	1	BI	5	90	60	97	72
2	7F	C	15-apr-04	04-apr-04	_	4	P	1	BI	5	90	134	97	162
3	7H	C	15-apr-04	04-apr-04	_	4	P	1	BI	5	90	43	97	49
4	7G	C	15-apr-04	04-apr-04	_	4	P	1	EC	5	90	72	97	83

NESDIS	S#	Description	SHEF
FA635744	9	RAIN ACCUMULATION, INCHES	PC
FA635744	10	WINDSPEED, MILES PER HOUR	US
FA635744	11	WIND DIRECTION, DEGREES	UD
FA635744	12	AIR TEMPERATURE, DEGREES F., STANDARD PL	TA
FA635744	13	FUEL TEMPERATURE, DEGREES F.	MT
FA635744	14	RELATIVE HUMIDITY, PERCENT	XR
FA635744	15	BATTERY VOLTAGE, VOLTS	VB
FA635744	17	FUEL MOISTURE, STICK WEIGHT, 10 HR PERCE	MX
FA635744	18	WIND DIRECTION, DEGREES, PEAK	UX
FA635744	19	WINDSPEED, MILES PER HOUR, PEAK	UP

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Appendix K: WILDLAND FIRE IMPLEMENTATION PLAN

(Insert CD here)

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Appendix L: BURNED AREA EMERGENCY STABILIZATION AND REHABILITATION PLAN

Emergency stabilization and rehabilitation activities address disturbance created as a result of fire suppression activities and disturbance caused by the potential effects of the fire itself. The fire suppression rehabilitation is done as part of the wildland fire operations, such as raking in hand-line construction and occurs shortly after the fire has been contained or declared out. These costs are generally covered by the fire. Burned area emergency stabilization and rehabilitation (BAER) addresses potential impacts on park resources as a result of the fire itself and is funded separately from the wildland fire through the Burned Area Emergency Response Program. This involves assessing the fire and the potential damage to park resources including minor structures, roads and trails, cultural and natural resource, park infrastructure. A plan must be drafted that assesses the threat with recommended treatments and associated costs to each resource at risk. Emergency stabilization addresses immediate threats such as those that will be negatively impacted by the next intense thunderstorm. Rehabilitation address those resources impact by the fire but the threat is not immediate, such as seeding to prevent the establishment of non-natives in areas were burn severity is high. The plan must be submitted within seven days of the fire being controlled. Because of the immediacy of the plan it is recommended that the park obtain outside resource in the form a BAER team to assist in drafting the plan.

<u>Rehabilitation of Suppression Actions</u>
As soon as the fire poses no significant threat to park resources and with approval of the Incident Commander, rehabilitation of areas impacted by fire suppression activities can begin. Rehabilitation of suppression impacts are to be charged to the fire. Type I and II crews released from fire suppression operations can be resigned to accomplish much of this work. Areas that may need to be addressed will be the following:

- Hand-line rehabilitation:
    - Soil berms as a result of handline construction will need to be raked back into place.
    - Seeding may or may not be needed. Consult with a resource advisor for their recommendation.
    - In some instances standing snags or charred trees may be cut and placed across the hand line in such a way that water is diverted off and away from the hand-line to prevent channelization. Straw waddles or other suitable material may be used in place of standing dead snags or trees.

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- Where a safety zone was created by clearing brush or trees the resulting slash may needed to be bucked into smaller pieces and scattered across the site.

- Dozer/Grader Line rehabilitation:
  - Dozers lines created to protect park infrastructure at Panther Junction or the Chisos Basin from a rapidly advancing fire will require rehabilitation. This will require blading disturbed soil back into place, possibly seeding and mulching to create safe sites for seedling establishment and to prevent invasive from becoming established. Prescriptions for this will need to be developed with a resource advisor.

- Retardant dropped onto structures may need to be removed to prevent staining of structures built during the CCC era. Most susceptible is unpainted stone masonry. There are no open bodies of water or streams near where a retardant drop is most likely to occur. The potable water supply for both Panther Junction and the Chisos Basin is from ground water and is in no danger of contamination from retardant.

Burned Area Emergency Response Plan (BAER)

Most areas of the park that burn will not require emergency stabilization or rehabilitation. The primary area that may possibly need a response plan and mitigation are resources in the Chisos Basin and the watershed above. The primary threat would be from increased runoff and debris flow that could damage cottages and the lodge, choking culverts and damaging bridges. The magnitude of the threat would need to be assessed to determine what level if mitigation, if any, is needed. If it is found that mitigation is needed a plan would be develop that would identify what measures are to be taken and the associated costs. This plan could be submitted to the regional office to determine eligibility for BAER funding. If mitigation exceeds the capability BAER funding such as the replacement or repair of major facilities or infrastructure other funding source will need to be pursued. This plan would need to be submitted within 7 days of the fire being controlled or declared out. Values potentially at risk could include, but not limited to the following:

- Natural Resources (threatened and endangered species, sensitive species, and exotic species. In the case of federally listed species emergency consultation with the Fish and Wildlife Service would be required).

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- Cultural Resources (If culturally significant resources are at risk emergency consultation with the State SHPO will be required)
- Structures
- Electrical power distribution (transmission lines, transformers, substations, etc)
- Communications: telephone lines, radio repeaters, etc.
- Water supply: this could include damage to pumping and or water storage facilities, contamination of potable water supply, etc. (Consultation with Texas Commission of Environmental Quality (TCEQ) may be required)
- Sewage treatment facilities: (Consultation with Texas Commission of Environmental Quality (TCEQ) may be required)
- Roads and trails: This would include choked culverts, damaged bridges and accelerated erosion on trails.

Below is the procedure to be followed in the event of a fire that could place high value area(s) or resources at risk.

1. As soon as possible, while the fire is ongoing, assemble the park's resource management staff, Building and Utilities Staff and Roads and Trails staff.

2. If a substantive threat exists warranting the development of a Burned Area Emergency Response plan; consult with the Intermountain Region BAER coordinator for concurrence. Once the concurrence is obtained determine the level of assistance needed and order needed resources through Lincoln Zone. This could included the following resources:

   - BAER Team Leader
   - GIS Specialist
   - BAER Hydrologist
   - BAER Soil Scientist
   - Archeologist
   - Wildlife Biologist
   - Vegetation Management Specialist /
   - Botanist
   - Ecologist
   - Weed Specialist
   - Civil Engineer.
   - Document Clerk
   - NEPA Specialist

   At a minimum a BAER team leader will work with park staff in developing a plan and then compiling it for submission with the superintendent's approval. It is strongly recommended that in addition to the BAER team leader, a BAER hydrologist and BAER soil scientist,

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supported by a GIS specialist be ordered. The BAER hydrologist, soil scientist supported by GIS specialist are trained to work with Burned Area Reflectance Classification (BARC) maps and will provide park staff a with a better overall assessment of the fires impacts on park resources. The park, together with the BAER Team Leader can determine if additional resources are needed to assist park staff in developing the BAER plan. **Note:** the BAER Team Leader, as with the IC, works for the Park Superintendent and receives Designation of Authority from the Superintendent.

3. Prior to BAER team arrival, identify a working location separate from the ICP, assuming the fire is ongoing, that the BAER Team can work and not hinder normal park operations. The location must also have electrical power, internet access, and telephone communications.

4. Provide a location for morning and evening briefings for BAER Team and Park Staff.

5. Provide needed data to assembled BAER team including GIS data, such as location of critical resources, soil maps, vegetation maps, infrastructure maps, and other relevant data.

6. If mitigation measure(s) are needed their justification(s) must be documented, with associated prescription(s) and appropriate NEPA compliance for the proposed action.

7. Once the plan is completed and the superintendent has been briefed and approved the plan it is submitted to the Intermountain Region BAER coordinator who will review the plan and then forward to the National NPS BAER Coordinator in the NPS National Fire Program Center in Boise, ID.

Specific considerations of every Burned Area Emergency Rehabilitation (BAER) effort will consider these sensitive species and resources:

- The endangered Mexican Long-Nosed Bat (*Leptonycteris nivalis*) and their supportive habitat, covering 122,600 acres of the Park.

- The endangered fish species, Big Bend Gambusia (*Gambusia gaigei*), that lives in small ponds at Rio Grande Village.

While it is not possible to forecast future fire locations, below are some values at risk from fire and potential watershed response to fire at Big Bend National Park

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The endangered black capped vireo (*Vireo atricapilla*). The Big Bend population is small even through suitable habitat is abundant (Cornelius 2004).

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- The threatened Chisos Mountain Hedgehog Cactus (*Echinocereus chisoensis var. chisoensis*).

- Numerous cultural resources, including both historic and prehistoric sites.

- Numerous rare plant species and communities, particularly those concentrations of rare species found in the Chisos Mountains.

- Steep slopes and redouble soils laid bare by fire.

- The concentration of park developments in the Chisos Basin vicinity, including the Chisos Mountains Lodge, Visitor Contact Station, and campgrounds.

Other issues of concern include the potential for spread of non-native plants, primarily Bermuda grass, salt cedar, giant reed, buffelgrass and Lehmann lovegrass. The invasive buffelgrass (*Pennisetum ciliare*) occupies the spaces between desert shrubs, including areas that are not naturally vegetated, thus creating a continuous fuel load and changing the fire frequency of the environment. Related to this concern, is the common use of grass seeding post-fire to protect watersheds from soil erosion and to provide competition with the invasive grass species. There is some indication that the seeding of native grass species may be less effective than seeding of non-native perennial grass species in suppressing the growth of invasive grasses.

This plan addresses what emergency stabilization or rehabilitation that can generally be expected from suppression activities or from direct effect of the fire. Other factors may arise that are not addressed in this general rehabilitation plan. These unanticipated factors will need to be addressed by the IC or BAER team, in collaboration with park staff.

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Appendix M: Example Delegation of Authority

As of _____, I have delegated authority to manage the _____Fire, Big Bend National Park to Incident Commander _____. Your expertise in the management of wildland fires will assist Big Bend National Park in accomplishing stated land and resource management objectives. In order to carry out this responsibility, I want to ensure that you are aware of the following constraints and special concerns.

My objectives for this _____ are:

- Provide for fire fighter and Park visitor health and safety.
- All newly established fireline will be rehabed.
- _____
- _____
- _____
- _____

Considerations for management of the _____ fire are:

My resource advisors (READ) will be Fire Ecologist, Richard Gatewood or Biologist, Raymond Skiles or Botanist, Joe Sirotnak or Geologist, Don Corrick or Archeologist Tom Alex. A READ should be contacted immediately after the fire is reported. If these designated READs are unavailable, contact the Chief of Resource Management, Vidal Davila, for an alternate.

	Office	Home	Cell
Rick Gatewood	432-837-7056	432-837-1456	432-770-8785
Raymond Skiles	432-477-1145	432-477-2232	
Joe Sirotnak	432-477-1148	432-477-2229	
Don Corrick	432-477-1142	432-477-2306	
Tom Alex	432-477-1144	432-371-2917	
Vidal Davila	432-477-1143	432-477-2358	

Key resource considerations are:

* Threatened and Endangered plant and animal habitat
* Sensitive Plant Habitat
* _____
* _____

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* _____
* _____

Key cultural features requiring priority protection are:

* Archeological Sites
* Historic Sites
* _____
* _____
* _____
* _____

Restrictions for management actions are:

* No tracked or wheeled vehicles in the proposed wilderness.
* Leave standing snags unless they present a hazard to personnel assigned to the fire or future trail users.
* Manage any suppression activities to minimize deterioration of Park trails.
* Manage the fire with as little environmental damage as possible (use MIST techniques).
* Manage the fire cost-effectively for the values at risk.
* _____
* _____
* _____

Acceptable minimum tools

* water bucket drops
* use of fugitive retardant in areas where water drops will not be as effective
* Type II or III helicopters preferred
* chainsaws
* pumps
* _____
* _____

My agency advisor will be the Park Fire Management Officer John Morlock.

Provide maximum training opportunities for the National Park Service, Interagency Fire Use Management Team, and cooperators to increase organizational effectiveness.

Minimum disruption of visitor access to the Park trails into the High Chisos backcountry.

Contain escapes or spots as efficiently as possible - acreage is not a controlling factor.

_____
Superintendent
Big Bend National Park

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Appendix N: Incident Complexity Analysis- Incident Type 3, 4, and 5

Incident Complexity Analysis (Type 3, 4, 5)

	Yes	No
Fire Behavior		
Fuels extremely dry and susceptible to long-range spotting or you are currently experiencing extreme fire behavior.		
Weather forecast indicating no significant relief or worsening conditions.		
Current or predicted fire behavior dictates indirect control strategy with large amounts of fuel within planned perimeter.		
Firefighter Safety		
Performance of firefighting resources affected by cumulative fatigue.		
Overhead overextended mentally and/or physically.		
Communication ineffective with tactical resources or dispatch.		
Organization		
Operations are at the limit of span of control.		
Incident action plans, briefings, etc. missing or poorly prepared.		
Variety of specialized operations, support personnel or equipment.		
Unable to properly staff air operations.		
Limited local resources available for initial attack.		
Heavy commitment of local resources to logistical support.		
Existing forces worked 24 hours without success.		
Resources unfamiliar with local conditions and tactics.		
Values to be protected		
Urban interface; structures, developments, recreational facilities, or potential for evacuation.		
Fire burning or threatening more than one jurisdiction and potential for unified command with different or conflicting management objectives.		
Unique natural resources, special-designation areas, critical municipal watershed, T&E species habitat, cultural value sites.		
Sensitive political concerns, media involvement, or controversial fire policy.		

If you have checked "Yes" on 3 to 5 of the analysis boxes, consider requesting the next level of incident management support.

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MISSION
DEPARTMENT OF THE INTERIOR

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

MISSION
NATIONAL PARK SERVICE

The National Park Service preserves unimpaired
the natural and cultural resources and values
Of the National Park System
for the enjoyment, education, and inspiration
of this and future generations.
the Park Service cooperates with partners
to extend the benefits
of natural and cultural resource conservation
and outdoor recreation throughout the Country.

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