

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

**Carlsbad Caverns National Park  
New Mexico**



# **Fire Management Plan**

**August 2005**





# **Fire Management Plan**

**National Park Service**

**Carlsbad Caverns National Park**

**New Mexico**

**August 2005**

*Prepared by:* Jim McMahon, Fire Management Officer

Date: August 2005

*Approved by:* \_\_\_\_\_ Date: \_\_\_\_\_  
Superintendent, Carlsbad Caverns National Park



# Table of Contents

<b>I. Introduction.....</b>	<b>1</b>
A. Reasons for Developing this Plan.....	1
B. Resource Management Relationship .....	1
C. Relation to Wildland Fire Policy and Legislation .....	1
D. Compliance.....	1
E. Authorities for Implementing this Plan .....	2
<b>II. Relationship to Land Management Planning and Fire Policy .....</b>	<b>2</b>
A. NPS Management Policies Concerning Fire Management .....	2
B. Enabling Legislation and Purpose of Carlsbad Caverns National Park .....	2
C. Relationship of Park Management Documents to Wildland Fire Management .....	4
D. How the Fire Management Plan will Help Meet the Park’s GMP and RMP.....	4
<b>III. Wildland Fire Management Strategies.....</b>	<b>4</b>
A. General Management Considerations.....	4
B. Wildland Fire Management Plan Goals and Objectives.....	4
C. Wildland Fire Management Options .....	6
D. Description of Wildland Fire Management Strategies by Fire Management Units (FMUs) ...	8
<b>IV. Wildland Fire Management Program Components.....</b>	<b>13</b>
A. General Implementation Procedures.....	13
B. Wildland Fire Suppression .....	13
C. Wildland Fire Use Guidelines .....	21
D. Prescribed Fire.....	29
E. Non-Fire Fuel Treatment Applications.....	33
F. Emergency Rehabilitation and Restoration .....	34
<b>V. Organizational and Budgetary Parameters .....</b>	<b>35</b>
A. FMO Organizational Structure .....	35
B. FIREPRO Funding.....	36
C. FMO Organization and How it Relates to Park Operations .....	36
D. Summary of Fire Management Responsibilities.....	36
E. Interagency Coordination to Implement the FMP .....	39
F. Key Interagency Contacts by Function .....	39
G. Wildland Fire Agreements.....	40
<b>VI. Monitoring and Evaluation.....</b>	<b>40</b>
<b>VII. Fire Research .....</b>	<b>40</b>
A. Fire History.....	40
B. Fire Ecology.....	41
C. History of Fire Research at Carlsbad Caverns National Park .....	41
D. Fire Research Needs at Carlsbad Caverns National Park.....	42
<b>VIII. Public Safety.....</b>	<b>44</b>
A. Public Safety Issues and Concerns .....	44
B. Public Safety Protection .....	44
<b>IX. Public Information and Education .....</b>	<b>46</b>

A. Year-Round Activities .....	46
B. Fire In-Progress Activities .....	46
<b>X. Protection of Sensitive Resources.....</b>	<b>46</b>
A. Protection of Sensitive Resources .....	46
<b>XI. Fire Critiques and Annual Plan Review.....</b>	<b>50</b>
A. Fire Critiques .....	50
B. Procedure for Revising this Fire Management Plan .....	50
<b>XII. Consultation and Coordination.....</b>	<b>50</b>

**List of Figures**

<b>Figure 1.</b> Map of Vicinity of Carlsbad Caverns National Park .....	3
<b>Figure 2.</b> National Wildfire Coordination Group Wildland Fire Management Policy Flowchart .....	8
<b>Figure 3.</b> Fire Management Unit Map .....	10
<b>Figure 4.</b> Fire Family Plus Graphic for Batdraw RAWS.....	16
<b>Figure 5.</b> Fire Management Organization.....	35

**List of Tables**

<b>Table 1.</b> Historical Natural Fire Regimes .....	21
<b>Table 2.</b> Fire Regime Current Condition Class.....	22

**Appendices**

<b>Appendix A.</b> Environmental Assessment .....	(on attached CD)
<b>Appendix B.</b> New Mexico State Historic Preservation Office Concurrence .....	
<b>Appendix C.</b> Fire History Map.....	
<b>Appendix D.</b> Wildland Fire Prevention Analysis and Action Plan .....	
<b>Appendix E.</b> Preparedness Staffing/Step-Up Plan .....	
<b>Appendix F.</b> Wildland Fire Pre-attack Plans .....	
<b>Appendix G.</b> Southwest Area Preparedness Levels .....	
<b>Appendix H.</b> Definitions .....	
<b>Appendix I.</b> Fire Cache Inventory .....	
<b>Appendix J.</b> Cooperative Agreements for Wildland Fire.....	
<b>Appendix K.</b> Briefing Package for Incoming Incident Management Team.....	
<b>Appendix L.</b> MIST (Minimum Impact Suppression Tactics) .....	
<b>Appendix M.</b> Prescribed Fire Plan Format.....	
<b>Appendix N.</b> Fire Use and Prescribed Fire Prescriptions .....	
<b>Appendix O.</b> Wildland and Prescribed Fire Monitoring Plan .....	
<b>Appendix P.</b> Multi-Year Prescribed Fire/Fuel Reduction Strategy.....	
<b>Appendix Q.</b> Cultural Resources Component .....	
<b>Appendix S.</b> Sensitive Species Lists.....	
<b>Appendix Y.</b> References Cited .....	
<b>Appendix Z.</b> Annual Update to the Fire Management Plan .....	

**Acronyms Used**

AQRV	Air Quality Related Values
BA	Biological Assessment
BLM	Bureau of Land Management
BO	Biological Opinion
DO-18	Director's Orders 18, Wildland Fire Management
EA	Environmental Assessment
ESA	Endangered Species Act
FEMO	Fire Effects Monitor
FIREPRO	Fire Program
FMO	Fire Management Officer
FMP	Fire Management Plan
FMU	Fire Management Unit
FPMA	Fire Program Management Assistant
FUMA	Fire Use Manager
GMP	General Management Plan
IC	Incident Commander
IMR	Intermountain Regional Office (NPS)
IMT	Incident Management Team
IT	Information Technology
MMA	Maximum Manageable Area
NAAQS	National Ambient Air Quality Standard
NEPA	National Environmental Policy Act
NFDRS	National Fire Danger Rating System
NHPA	National Historic Preservation Act
NMED	New Mexico Environment Department
NPS	National Park Service
NWCG	National Wildfire Coordination Group
PAC	Protected Activity Center
PFM	Prescribed Fire Monitor
RAWS	Remote Automatic Weather Station
RM-18	Wildland Fire Management Reference Manual
RMP	Resource Management Plan
SACS	Shared Application Computer System
SHPO	State Historic Preservation Office
T&E	Threatened and Endangered
USFS	US Forest Service
USFWS	US Fish and Wildlife Service
WFIP	Wildland Fire Implementation Plan
WFSA	Wildland Fire Situation Analysis
WFU	Wildland Fire Use
WIMS	Weather Information Management System
WPIRG	Wildland and Prescribed Fire Management Policy Implementation Procedures

## Reference Guide

### **Glossary of Terms**

There are excellent wildland fire terminology glossaries in RM-18, Chapter 2 and in the WPIRG.



## I. Introduction

### A. Reasons for Developing this Plan

This fire management plan (FMP) outlines actions that will be taken by Carlsbad Caverns National Park to meet the fire management goals for the area. The plan meets the requirement in DO-18 that “all park units with vegetation capable of sustaining fire develop a Fire Management Plan.”

### B. Resource Management Relationship

The natural resources component of the *Carlsbad Caverns National Park Resource Management Plan* (RMP) addresses the issue of wildland fire management in a general manner. This specific action plan implements fire related management actions from the RMP.

### C. Relation to Wildland Fire Policy and Legislation

This plan implements current interagency fire management policies and legislation. It helps achieve resource management and fire management goals as defined in:

- *The Federal Wildland Fire Management Policy and Program Review* (2000)
- *Managing Impacts of Wildfires on Communities and the Environment and Protecting People and Sustaining Resources in Fire Adapted Ecosystems – A Cohesive Strategy* (also known as the *National Fire Plan*, Congressional legislation delivered to USDI/USDA 2000)
- *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10 Year Comprehensive Strategy Implementation Plan* (an adjunct to the *National Fire Plan* 2001)

### D. Compliance

An environmental assessment (EA) documents the NEPA analysis for the plan and is included in Appendix A (on CD-ROM). New Mexico State Historic Preservation Office (SHPO) compliance is documented in Appendix B and meets National Historical Preservation Act (NHPA) requirements. Future prescribed burns and other treatment projects will also have additional compliance work completed prior to project implementation. This will include biological assessments and cultural/historical site surveys as appropriate.

The EA analyzed several alternatives and considered many comments and suggestions from both internal and external sources. The *Full Toolbox* alternative was chosen by park managers as the preferred alternative.

The Full Toolbox alternative is a fully integrated fire management plan and allows resource managers to use all available strategies to meet the FMP’s goals and objectives. This alternative has two fire management units (FMU). FMU 1 is a relatively small fire management unit that surrounds the visitor center area, facilities, and residences, and the area of the park adjacent to Whites City. FMU 1 is the site of full suppression and prescribed burning. The rest of the park is comprised of FMU 2 and embraces the full toolbox approach of wildland fire use, prescribed fire, suppression, and mechanical fuel reduction as management options. FMU 2 specifies protection measures for special features, such as habitat of threatened and endangered species and sensitive cultural resources. The full toolbox approach also includes collaborative fire management with park neighbors, particularly the Bureau of Land Management (BLM) on the northeast boundary and the US Forest Service (USFS) on the west boundary. Ideally, the park would cooperate with neighboring agencies and private landowners on prescribed fire, wildland fire use, monitoring fire effects and suppression activities; and fires would not be automatically suppressed at the park boundary.

### **E. Authorities for Implementing this Plan**

Authority for carrying out a fire management program at Carlsbad Caverns National Park originates with the Organic Act of the National Park System (August 25, 1916). This Act states that the primary goal of the National Park Service (NPS) is to preserve and protect the natural and cultural resources found on lands under its management in such manner as will leave them unimpaired for future generations.

Directors Order-18 (November 1998), and Reference Manual RM-18 (February 1999) and its amendments are the guiding documents for fire management plan implementation. Service-wide fire management policy is expressed in the current revisions of the directors order and attendant reference manual for the NPS, and *The Wildland and Prescribed Fire Management Policy: Implementation and Reference Guide (WPIRG)*, and is incorporated herein by reference. The park's fire management objectives conform to the referenced documents.

## **II. Relationship to Land Management Planning and Fire Policy**

### **A. National Park Service Management Policies Concerning Fire Management**

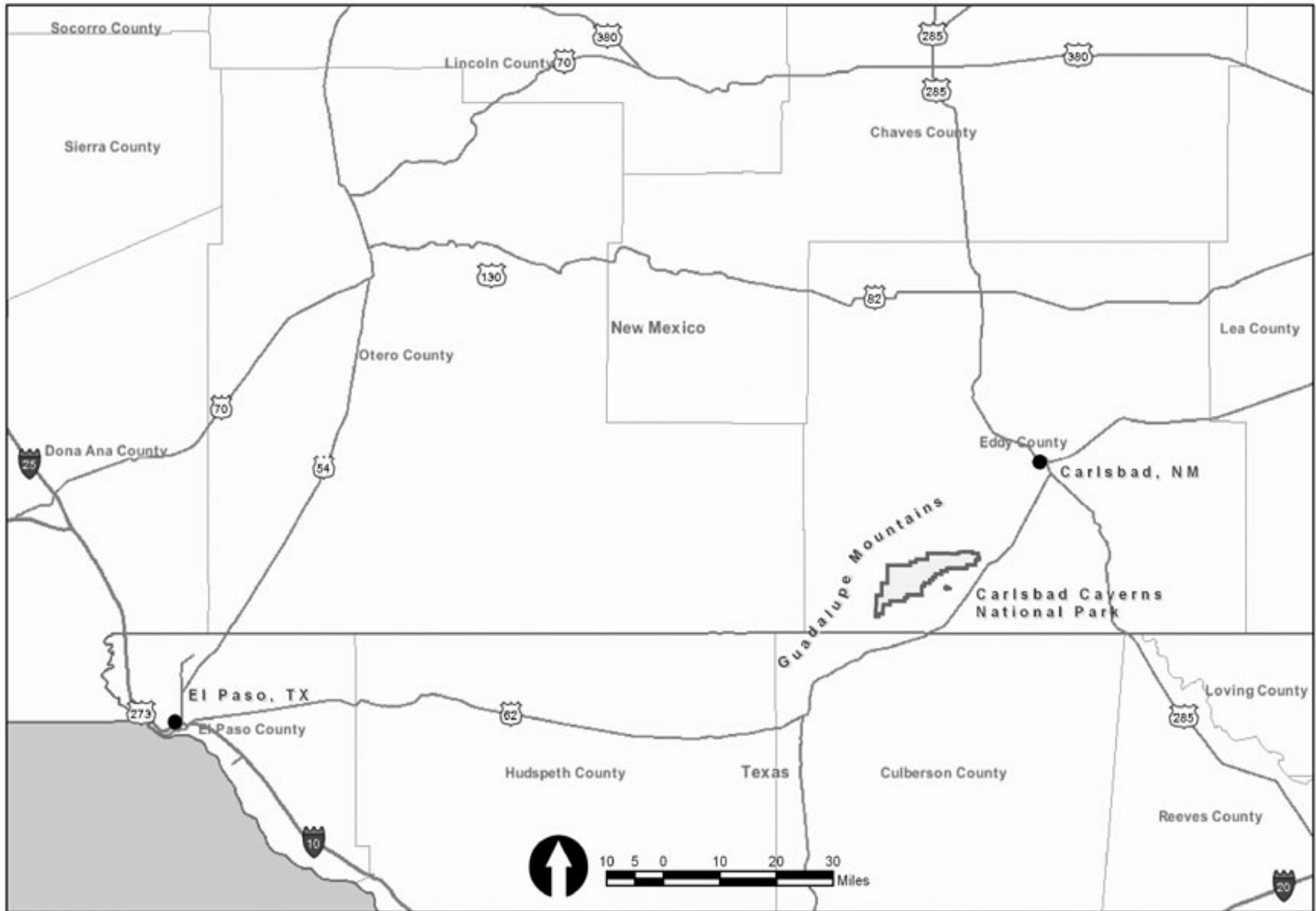
The NPS recognizes the occurrence, as well as the absence of fire, as integral factors influencing parks. Fire management policies are set forth in Section 4.5 of the 2001 Management Policies (NPS 2001a) and are summarized as follows:

- Fire management programs will meet resource management objectives while ensuring protection of life and property.
- Parks with vegetation capable of burning will prepare fire management plans and address funding and staffing required by fire programs.
- Fire plan development will include the National Environmental Policy (NEPA) compliance process and necessary collaborations with outside parties.
- Fires in vegetation are to be classified as wildland or prescribed fires.
- Wildland fires are 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 minimize impacts while protecting life, property, and resource values.
- Suppression in wilderness will be consistent with the *minimum requirement* concept.

### **B. Enabling Legislation and Purpose of Carlsbad Caverns National Park**

Carlsbad Caverns National Park is located in the Guadalupe Mountains of southeast New Mexico (Figure 1). The park was established by Congress on May 14, 1930. In 1978, Congress designated 33,125 acres (approximately 71 percent) of the park as *wilderness*. Managers of legislated wilderness areas are required by the Wilderness Act of 1964 to “be responsible for preserving the wilderness character of the area and shall so minister the area for such purposes for which it may have been established as also to preserve its wilderness character.” It is implicit in this act, therefore, that allowing the continuation of processes, such as naturally occurring wildland fires, is an important part of preserving the wilderness character.

**Figure 1.** Location of Carlsbad Caverns National Park.



3



### **C. Relationship of Park Management Documents to Wildland Fire Management**

The fire management plan for Carlsbad Caverns National Park is a detailed program of action to carry out fire management policies and objectives. Broad resource management policies for Carlsbad Caverns National Park can be found in the park's *General Management Plan* (GMP).

These policies are refined into specific resource management goals in the RMP. The RMP further identifies the specific management objective of using fire as a tool in restoring and maintaining the natural environment of the park.

The fire management plan is an integral part of the RMP. It describes specific management strategies for the preservation of the wilderness character of the park. The RMP states that the park's wilderness, and all of the park's undeveloped areas "will be managed as a natural zone wherein fire will be restored to its natural role as a primary agent in the maintenance of natural vegetation mosaics, and... will be allowed to continue unimpeded."

### **D. How the Fire Management Plan will Meet the GMP and RMP**

Fire once played an important role in the functioning of the upper Chihuahuan Desert ecosystem. Naturally occurring fires have helped shape the landscape over time and maintain the diversity of species. Many plant and wildlife species have evolved under the influence of fire and, in some cases, depend on fire for their continued existence. To remove all fires from an ecosystem deprives that system of a powerful and dynamic natural force. The ultimate goal of fire management in the National Park System is to restore fire to park ecosystems where possible through wildland fire use and prescribed fires. Human-caused wildland fires will not be considered candidates for wildland fire use and will be suppressed. An approved fire management plan will aid in meeting the goals of the park.

## **III. Wildland Fire Management Strategies**

### **A. General Management Considerations**

The fire season at Carlsbad Caverns National Park statistically starts in March and lasts until November. During these months, wildland fires normally spread from a point of ignition at varying intensities and rates. It must be noted here that wildland fires have occurred in the Guadalupe Mountains area during every month of the year.

This update of the park's current fire management plan continues many of the strategies of the 1995 plan. Wildland fire use, suppression, prescribed burning, and non-fire fuels treatments remain the basis for action. Ideally, the park will one day be in a condition that safely allows maximizing wildland fire use. It will take an aggressive prescribed burning program to achieve these goals. The current plan particularly emphasizes the treatment of problem fuels areas and cooperation with the BLM and the USFS along the park's boundaries.

### **B. Wildland Fire Management Plan Goals and Objectives**

The interdisciplinary team developed the following goals (italicized) and objectives (bulleted) for the Carlsbad Caverns National Park fire program:

*Protect people and property as the highest priority.*

- Provide for the safety of visitors, firefighters and staff.
- Directly protect real and personal property from the effects of fire.
- Reduce fuels with prescribed fire and thinning in places where wildfire is a threat to people and property.

- Implement programs to prevent unplanned human-caused ignitions and reduce human-caused wildfires.
- Strive to meet health and safety standards that relate to fire, particularly for air quality and on-the-job safety (e.g., OSHA regulations).

*Protect park natural and cultural resources from undesirable effects of fire and suppression.*

- Reduce fuels with prescribed fire and thinning in places where fire would adversely affect park resources.
- Avoid negative effects to sensitive areas.
- Employ minimum impact suppression tactics, particularly in wilderness or other sensitive areas.

*Suppress unwanted fire.*

- Ensure park is adequately prepared to suppress unwanted wildland fire.
- Suppress all human-caused fire.
- Prevent unwanted fire from spreading onto neighboring government and private lands.

*Allow fire to assume its natural role in park ecosystems with justification.*

- Determine fire-related data needs relative to natural resources.
- In particular, attempt to determine range of natural variation related to fire (in time, space and intensity), role of fire, and fire effects on species in Chihuahuan Desert and Guadalupe Mountains ecosystems.
- Search for scientific results relative to data needs and apply to fire program.
- Promote research in the park relative to data needs and apply results to fire program.
- Tap the experience of individuals familiar with fire in the Guadalupe Mountains.
- Monitor fire effects and incorporate results into fire program.
- Determine desired conditions before allowing or introducing fire.

*Use wildland and prescribed fire for resource management purposes.*

- Return fire to fire-dependent ecosystems.
- Specify and aim for desired conditions.
- Keep fire use within the natural range of variation (in time, space, and intensity).
- Reduce fuels in places where fire would adversely affect resources.
- Look for opportunities to use fire to restore and maintain cultural landscapes.

*Manage fire cooperatively with neighboring agencies and private land owners as well as other stakeholders.*

- Maintain open lines of communication.
- Collaboratively plan and implement fire operations.
- Enter cooperative agreements covering fire-related activities.
- Jointly conduct fire research programs.

- Jointly deliver consistent messages about fire prevention and management.

*Coordinate fire activities with all park divisions and the public.*

- Openly communicate about fire activities with all park divisions.
- Incorporate appropriate fire management tasks into all park divisions.
- Keep the public informed about park fire operations, taking advantage of interpretive opportunities when presented.

National Park Service fire management policy directs the park to manage for the continued presence of fire on the landscape, while protecting human safety and safeguarding the natural and cultural resources of the park. Fire management will be conducted in concert with vigorous research that contributes to our understanding of how fires influence key resources and ecosystem process.

The park will deploy the full toolbox of alternative strategies that are available to wildland fire managers. This will include full suppression where necessary, prescribed fire where needed, wildland fire use wherever and whenever possible, and manual fuel reduction where necessary.

The park will endeavor to manage all aspects of wildland fire in concert with park neighbors and interagency cooperators. An interagency wildland fire plan for the Guadalupe Mountains is being discussed with cooperators and will continue to be developed as a concept.

### **C. Wildland Fire Management Options**

All fires in wildland vegetation will be classified as either wildland fires or prescribed fires. Wildland fires can either be suppressed using an appropriate management response or can be managed using a wildland fire use strategy. Prescribed fires are managed while within predetermined boundaries and prescriptions or are suppressed (if they are no longer within prescriptions) using an appropriate management response.

**1. Wildland Fires:** All wildland fires, regardless of cause, will have completed in a timely manner a Stage I, Initial Fire Assessment, Wildland Fire Implementation Plan (Stage I WFIP). The Stage I WFIP serves as the decision record for selection of the management strategy to be implemented and of the selection of an appropriate management response for wildland fires to be suppressed.

The WPIRG is the reference guide to all of the forms and procedures referenced in this section.

**a. Wildland Fire Suppression:** All wildland fires managed in a wildland fire suppression strategy will be suppressed using an appropriate management response. Appropriate management response is defined as specific actions taken in response to a wildland fire to implement protection and fire use objectives.

Appropriate management responses to specific wildland fires will be determined through evaluation of public and firefighter safety as the highest priority. Also to be considered are resource values at risk, potential suppression damage, economic expenditures, and the use of critical fire management resources. Management responses will vary from fire to fire and sometimes even along the perimeter of a fire. Appropriate management response options range from monitoring without on-the-ground disturbance to intense suppression actions on the perimeter of the fire.

For large or extended attack suppression fires, the Wildland Fire Situation Analysis (WFSA) is used to document all management decisions related to the selection of an appropriate management response.

Wildland fire suppression is discussed in greater detail in Chapter IV of this plan.

**b. Wildland Fire Use:** Due to the mandates of the Wilderness Act of 1964 and the mandates of parent plans to this plan, wildland fire use will be the strategy of choice for management of natural ignitions over most of the park. Wildland fire use is defined as wildland fire ignited by natural means (usually lightning) that is permitted to burn under specific prescription, in a preplanned location, and with adequate fire management personnel and equipment available to achieve certain defined resource management objectives.

All wildland fire use fires (WFUs) will be carefully monitored and documented. Since only naturally ignited fires may be managed as wildland fire use, sources of ignition will also be verified and documented for each WFU.

A Stage II, Short-term Implementation Actions, Wildland Fire Implementation Plan (Stage II WFIP) is completed to document management objectives, prescriptive criteria, and management parameters for wildland fire use.

A Stage III, Long-term Implementation Actions, Wildland Fire Implementation Plan (Stage III WFIP) is completed to document the maximum manageable area (MMA), additional management objectives or prescriptive criteria, or management parameters.

An ongoing or potential WFU that does not meet predetermined prescriptive elements or fails to meet resource management objectives will be suppressed using an appropriate management response. Current policy allows management for resource benefits of portions of a fire perimeter, while other portions of the perimeter of the same fire are managed with an appropriate suppression response.

Figure 2, the National Wildfire Coordination Group (NWCG) Wildland Fire Management Policy flowchart, displays the wildland fire certification and documentation process.

Wildland fire use is discussed in greater detail in Chapter IV of this plan.

## 2. Fuels Management

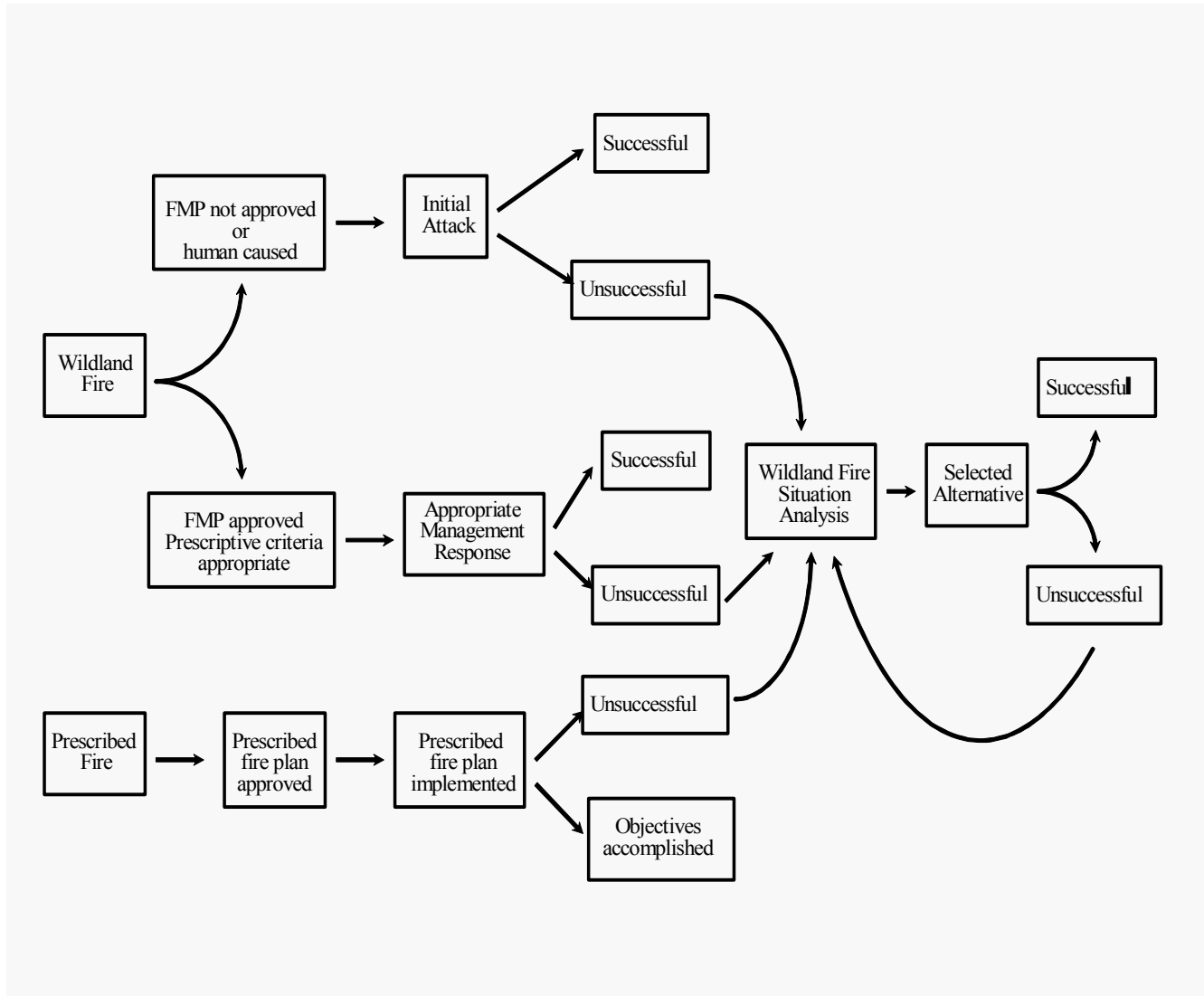
**a. Mechanical Fuel Reduction:** Mechanical fuel reduction using manual or mechanical thinning will be used primarily in FMU 1 (full suppression). The intent is to reduce wildland fire hazard to levels that enable local wildland fire suppression forces to control fires with minimal loss of values-to-be-protected. Hazard fuel reduction is discussed in greater detail in Chapter IV.

**b. Prescribed Fire:** The fire management strategy of past years of immediately suppressing all ignitions over the entire park has resulted, in many areas, in an accumulation of fuels beyond a natural fuel loading level. Prescribed burning will be used in these areas to decrease fuel loading. Additionally, there are areas of the park where range management or other natural resource management objectives may be best achieved by the use of prescribed fire. Prescribed fires are intentionally ignited to achieve certain resource management objectives in specific areas under prescription identified in approved prescribed fire plans.

The park's prescribed fire program is discussed in detail in Chapter IV.



**Figure 2.** National Wildfire Coordinating Group (NWCG) Policy Framework and Flowchart



**D. Description of Wildland Fire Management Strategies by Fire Management Unit**

A fire management unit (FMU) is any land management area definable by objectives, management constraints, topographic features, access, values-to-be-protected, political boundaries, fuel types, or major fire regime groups, etc., that sets it apart from management characteristics of an adjacent unit. Carlsbad Caverns National Park will contain two fire management units as detailed below and shown in Figure 3.

The park sits on the eastern end of the Guadalupe Mountains, in Eddy County, New Mexico, just north of the Texas state line. An escarpment that runs the park’s 21-mile length generally defines the southern edge of the park. Elevation in the park ranges from 3,595 feet at the base of the escarpment to 6,520 feet in the extreme western end of the park. The elevation along the escarpment decreases from west to east. Elevation at the visitor center is about 4,400 feet. Slopes below the escarpment are generally less than 10 percent. The remainder of the park, particularly the western portion, consists of a maze of steep, narrow canyons where slopes often exceed 70 percent with numerous cliffs. Watersheds drain primarily south and east from Guadalupe Ridge, which crosses the northwest corner

of the park parallel to the escarpment. The small area of the park north of Guadalupe Ridge drains to the northwest.

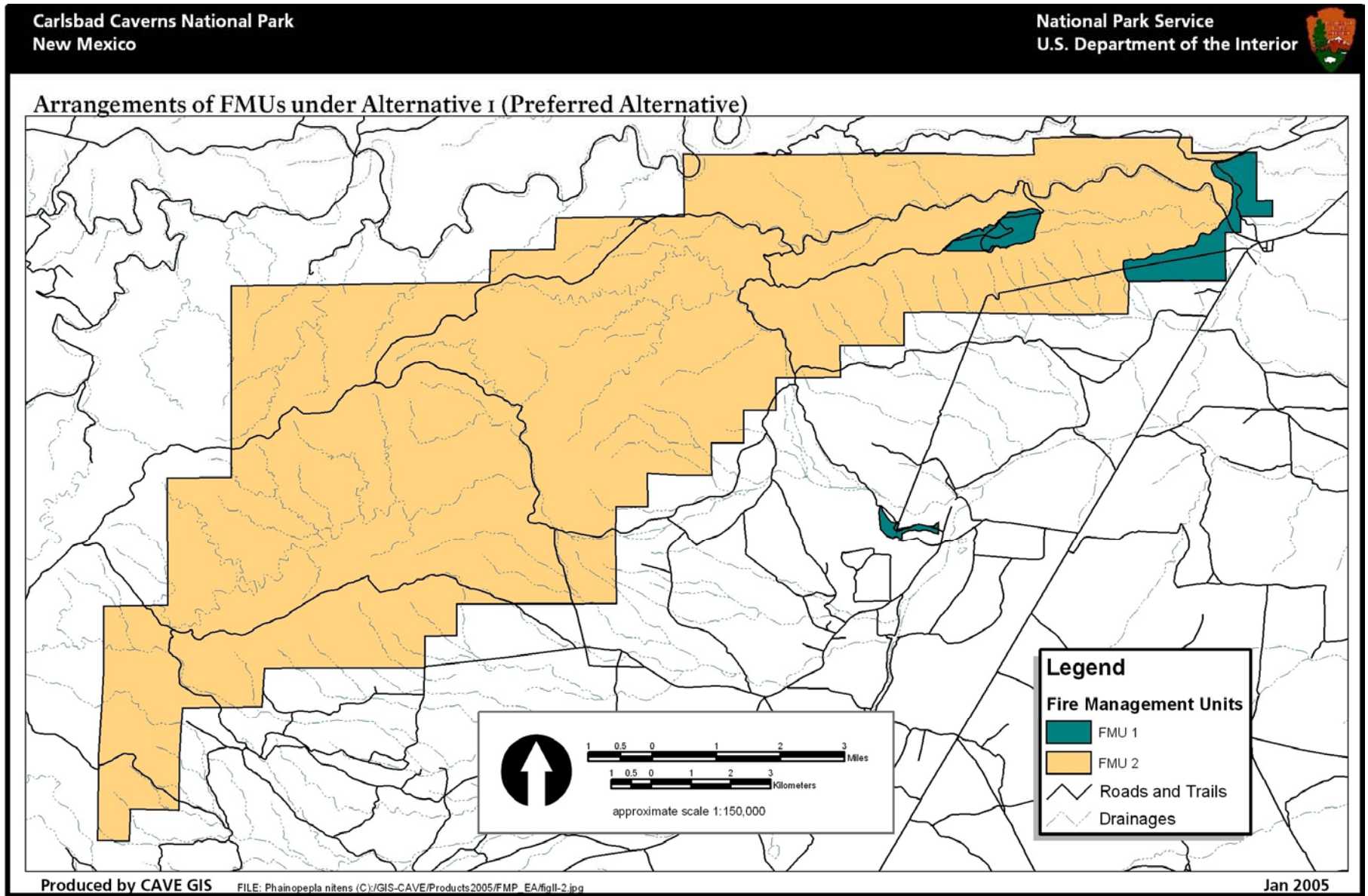
More than 20 permanent springs and seeps occur within the park. Surface water is otherwise scarce, and riparian areas are limited to a few places along normally dry washes. The largest spring, Rattlesnake Springs, flows at a rate of more than 1,000 gallons per minute and supports a significant riparian community. The spring also supplies water for human use in the developed areas in and around the park. Ephemeral pools in several canyons are also an important source of water for the park's wildlife.

The 46,766-acre park is considered one of the few protected portions of the northern Chihuahuan Desert. Caves are the park's main attraction, and aboveground features are of interest to a smaller subset of visitors and researchers. The park contains designated wilderness (33,125 acres) within its boundary. Desert scrub and grassland plant communities dominate the park landscape. Small pockets of coniferous woodland are found at higher elevations in the western third of the park. The climate is temperate and arid, characterized by warm summers and mild winters.

There are two fire management units, delineated primarily by whether or not wildland fire use is available for implementation. A small area excludes WFUs and designates a full suppression unit (FMU 1) around park developments such as the park headquarters, Rattlesnake Springs, and an area adjacent to Whites City in the extreme eastern part of the park. This unit allows suppression, manual fuels reduction, and prescribed fire to manage fire, fuels and vegetation. It was delineated to address the susceptibility of private and public property and residents to wildland fire and smoke. All unplanned fires—human- or lightning-caused—would be suppressed to protect developments and provide for the safety of park visitors and staff. The park will use manual fuels reduction to reduce fuel loading immediately around structures and other infrastructure within this unit. Prescribed fire may also be used to reduce fuels or manage vegetation. FMU 1 encompasses primarily grassland, desert shrubland, and riparian woodland communities.

The remainder of the park is delineated as FMU 2, where wildland fire use is an available tool in addition to the tools available in FMU 1. Although manual fuels reduction is an option, it would be used on a limited basis, primarily to remove fuel from around sensitive cultural and natural resources. Wildland fire use will be considered when conditions are within prescription and other criteria are met (appropriate management response). Unlike the previous fire management plan, which delineated a conditional suppression fire management unit to serve as a buffer between the park's interior and its boundary, here the buffer is included as part of FMU 2. It is believed that equivalent results can be achieved with the appropriate management response as the conditional suppression fire management unit. FMU 2 also specifies protection measures for special features such as habitat of threatened and endangered species. This unit contains all the vegetation communities found at Carlsbad Caverns (desert shrublands, desert grasslands, montane woodlands and chaparral, woodland and forest, and arroyo riparian woodlands and shrublands) and includes most of the park's designated wilderness. Protection measures would be required for sensitive natural and cultural resources in FMU 2. Fewer sites requiring protection are present in this unit than in FMU 1, but among them are the Putnam Cabin radio repeater and numerous Apache and pre-Apache work sites.

Figure 3. Fire Management Units



**1. The Full Suppression Unit (FMU-1):** All unplanned ignitions in the Full Suppression Unit will be suppressed using an appropriate suppression strategy. Prescribed fire may also be used in this unit.

**a. Unit Description:** The Full Suppression Unit (FMU 1) designation represents the area surrounding the park's visitor developments, residential areas, and the area near Whites City.

**b. Fire Management Strategies, Actions and Considerations:** In this unit (FMU 1), all unplanned ignitions will be suppressed and there will be no wildland fire use. All areas in this unit will, however, be subject to prescribed fire or manual fuel treatments for the purpose of fuel reduction or vegetation management. Individual sub-units identified in the Full Suppression Unit are as follows:

**Caverns Complex** (T24S, R25E, S30, S31; T24S, R24E, S25, S36): This sub-unit contains the Carlsbad Caverns visitor center, historic district, concession facilities, employee residences, maintenance facilities, and much of the park's utility systems. All natural and unwanted human ignitions will be suppressed in this block. However, hazardous fuel treatment activities will be conducted and will involve prescribed burns for elimination of high fuel concentrations and for protective black lining.

*Special considerations:* Likelihood of associated structural fires, smoke dispersal, utility systems, use of retardant, aesthetics in historic district and high visitor use area.

**Rattlesnake Springs** (T25S, R24E, S23): This sub-unit contains the Rattlesnake Springs Historic District and developed area. It includes a picnic area, grazing area for park stock, a pistol range, a residence/ranger station, and the park water system. All natural and unwanted human ignitions will be suppressed in this block. Hazardous fuel reduction and range management activities will be conducted with the use of prescribed burns or mechanical fuel treatments or a mix of both throughout this block. A cooperative agreement exists with the Nature Conservancy on the management of riparian areas within this block. Any prescribed burn in these areas will be planned with input from the local representative of that group. (See the *Rattlesnake Springs Management Plan* for more information regarding cultural and natural resource management in this sub-unit.)

*Special considerations:* Likelihood of associated structural fire, water-system facility and stored chlorine gas, adjacent ranch lands, threat to park-owned livestock, aesthetics in historic district and high visitor use area.

**Whites City** (T24S, R25E, S27, S33, S34): This full suppression sub-unit is adjacent to private property and the resort town of Whites City. Ignitions in this block are highly likely to produce undesirable smoke conditions and may possibly also create a hazard to public safety. Hazardous fuel reduction and prescribed fire may be conducted in this block.

*Special considerations:* Possibility of escape to private property and associated structural fire, threat to livestock and range improvements on adjacent private lands, and political implications of fire adjacent to affordable resort.

**c. Desired Future Conditions:** See Section IV-C-1b.

**2. The Natural Fire Unit (FMU 2):** The fire management strategy for natural (lightning) ignitions in FMU 2 will be the wildland fire use (WFU) strategy unless the ignition is not in compliance with prescription parameters or is human-caused. Prescribed fire may also be used in this unit.

**a. Unit Description:** The Natural Fire Unit (FMU 2) encompasses the entire park except for the full suppression areas of FMU 1. This unit includes the remote backcountry areas northwest and southeast of the park's wilderness.

**b. Fire Management Strategies, Actions and Considerations:** Human-caused wildland fires will be suppressed using minimum impact suppression tactics and maximizing safety of both firefighters and the public.

For each natural (lightning-caused) ignition in FMU 2, the superintendent will appoint a fire use manager (FUMA) based on the complexity analysis chart found in the WPIRG. The FUMA will later assume the duties of Incident Commander (IC) if the WFU is subsequently declared a wildland fire under suppression strategy.

A Stage I WFIP, using the format described in the WPIRG, will be prepared by the FUMA for each WFU in the Natural Fire Unit. This will be recertified daily by the superintendent. All WFUs will be monitored at least daily until declared out to ensure compliance with FMU 2's prescription parameters.

Stage II or Stage III WFIPs will be completed as warranted.

Monitoring of WFUs in the Natural Fire Unit will follow the guidelines found in Chapter VI of this plan.

The decision to classify a natural ignition as a WFU will be made only by the superintendent using the WFIP certification process. Since wildland fire use is the method recognized for properly managing the natural areas of this wilderness national park, his/her decision will normally allow a WFU to continue to burn within the Natural Fire Unit, provided it meets all prescription criteria and parameters.

**c. Management Considerations:** When a WFU in this unit is burning towards the park boundary, the superintendent will be immediately notified and the fire will be reevaluated for its merits as a WFU using the WFIP process. If the established Natural Fire Unit prescription is exceeded, the fire will be suppressed.

The maximum manageable area for any WFU is the park boundary; this can be adjusted on adjacent federal lands with agreement from the Lincoln National Forest or the BLM. If holding actions cannot prevent a WFU from escaping the maximum manageable area limits, suppression actions will be commenced.

When a WFU appears to be burning towards an adjacent portion of the Full Suppression Unit (FMU 1) and a holding action is not capable of stopping its progress the fire will be declared a wildland fire under suppression strategy and will be suppressed.

**d. Desired Future Conditions:** See Section IV-C-1b.

## **IV. Wildland Fire Management 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 wildland fire behavior. *Preplanned decisions* based on historical fire behavior indices should be considered to most efficiently aid in WFIP decisions requiring appropriate management response.

All processes and forms presented here can be found in the WPIRG.

For all park ignitions, a Stage I WFIP will be completed by the FMO, or other qualified person designated by the superintendent. Qualifications are found in the *Wildland Fire Use Implementation Procedures Reference Guide* (page 22). The superintendent will retain full authority to approve or disapprove the management decisions or appropriate management response chosen in the WFIP.

### **B. Wildland Fire Suppression**

#### **1. Potential Fire Behavior**

During the height of fire season, normally May and June, there is a potential for fires to move very rapidly (i.e., 100 feet/minute) and to grow very large, very quickly (i.e., 500 acres/hour). Safety of firefighters is a very real concern during this period and suppression strategies must always be crafted accordingly. Extreme fire behavior is typically the result of high winds, very low relative humidity, and hot temperatures. During periods of extreme fire behavior, most suppression resources have proven to be ineffective until a change in the weather occurred. Fire behavior during these periods has even remained extreme overnight (i.e., the Big Fire, 1990).

The park fire history map (Appendix C) shows fires of all sizes with the majority of fires being under an acre in size. Many lightning ignitions occur after the onset of the monsoon rainy season (July through October). These are typically very slow spreading and confined to the vegetation in the immediate area of the ignition. This is due to increased moisture and normally greened-up herbaceous surface fuels during this period.

The observed fire frequency is relatively moderate, with an average of twelve ignitions per year (based upon fire program (FIREPRO) analysis, 1984 - 2001). On a ten-year average, these could be predicted as five Class A, four Class B, and three Class C fires each year. However, there have been 41 Class D or larger fires since 1940, which clearly demonstrates the potential for a large fire to occur within the park.

While it is possible to have a major fire under less severe conditions, it appears that such a fire is most likely to occur when the temperature exceeds 75 degrees, relative humidity is less than 45 percent, and the wind speed measured at twenty feet above the ground level exceeds twenty miles per hour.

Lightning-caused fires during monsoon season have definitely accounted for the largest number of ignitions and acres burned. The potential in the Guadalupe Mountains for very large, wind driven fires cannot be ignored. High-wind events occur during prolonged dry periods prior to the onset of monsoon rains, and many last five or more days. In times of increased backcountry visitor use in and around the park, these high-wind events should cause particular reason for concern and preparedness. The human-caused Big Fire in 1990 (33,100 acres) was ignited at a backcountry location just west of the park at the beginning of a high-wind event. This wildfire thwarted most suppression efforts, and had the potential to burn most of the length of the park in one major run had not the high-wind event driving the fire finally abated after just three days duration.

## 2. Preparedness Actions

**a. Fire Prevention Program:** The park *Wildland Fire Prevention Analysis and Action Plan* (Appendix D) details by geographic areas of the park, patrols and other activities that will occur to prevent human-caused fires. The park *Preparedness Staffing Step-up Plan* (Appendix E) also details stepped up patrols of high-use areas of the park during periods of high to extreme fire danger. There have also been some efforts in recent years to provide for public education regarding fire prevention using the park's education coordinator.

The prevention analysis shows a very low risk of human-caused ignition for all of the backcountry of the park. However, the likelihood of increased backcountry use in the future could alter this situation. There does remain a substantial risk of a human-caused ignition in the front country as compared to that of the backcountry as almost a half million persons visit the Caverns complex each year. A carelessly discarded cigarette or match, an overheated vehicle, or a disintegrating catalytic converter along the entrance road or the Walnut Canyon Loop Road are the most likely human-caused hazards.

The objectives of a Fire Prevention Program in Carlsbad Caverns National Park are:

- To reduce the threat of human-caused fires through employee, visitor and park neighbor education.
- To integrate the prevention message into interpretive programs through involvement of the park's Division of Interpretation and Education.

Some general actions that will be undertaken to enhance fire prevention awareness and to prevent unwanted human-caused fires in the park include:

- Park division chiefs will twice annually ensure that all of their employees are familiar with the portions of this plan that are pertinent to fire prevention, and that they can properly explain fire prevention regulations and information to park visitors and neighbors. The fire management officer will assist the division chiefs by providing them with timely fire prevention information.
- Campfires will be prohibited at all times in all backcountry areas of the park as detailed in the park's *Backcountry Management Plan*.
- All other fire use (i.e., camp stoves, smoking, etc.) will be prohibited in all backcountry areas during prolonged periods of very high or extreme fire danger (i.e., Staffing Class IV or V). All such restrictions will be communicated by the fire management officer to the Lincoln Zone Coordination Center (LNZ) for the purpose of coordinating restrictions with other agencies.
- During periods of extreme fire danger (i.e., Staffing Class V), the superintendent may close any portion(s) of the backcountry he/she deems prudent to reduce the potential fire risk. In the event of a closure, all reasonable efforts will be taken by park staff to locate and remove visitors from the closed areas.
- Public information media will be used as necessary to advise both visitors and residents of extreme fire conditions and closures; the park-owned short range AM transmitters, which are used for information dissemination to park visitors, will also be utilized as necessary. Statements and releases for the public media will normally be coordinated through the park's public affairs specialist, helping to insure the accuracy of the information released.

- Signs, posters, displays, and appropriate interpretive activities will be placed at trailheads, the visitor center lobby, parking areas, and bulletin boards to warn visitors of the danger and to solicit their cooperation in fire prevention. Signs notifying park visitors of the current fire danger will be maintained at the Walnut Canyon and Slaughter Canyon entrances to the park.
- Roving foot and vehicle patrols will be utilized to enforce all park restrictions or regulations aimed at fire prevention.

The *Wildland Fire Prevention Analysis and Action Plan* (Appendix D) contains the specific prevention actions identified for specific areas of the park. This prevention analysis will be reviewed annually along with the rest of this plan and updated if changes occur that alter the identified risks, hazards, or values.

**b. Annual Training:** The park hosts a basic firefighter course at least once a year, typically early in the spring. At least three firefighter refresher courses are held in the park and with cooperators each year. Other training opportunities are provided, particularly on-the-job training opportunities on cooperator prescribed fires and suppression fires.

**c. Annual Preparedness Review:** An annual preparedness review of the fire program operations and equipment is held every year during the spring. There is an Intermountain Region (NPS) review every three to five years. The annual review is completed with Lincoln Zone interagency cooperators. Preparedness review recommendations are routed to the superintendent and the Regional Office. Preparedness review guidance may be found in the Red Book (*Interagency Standards for Fire and Aviation Operations* 2005) in Chapter 19-2.

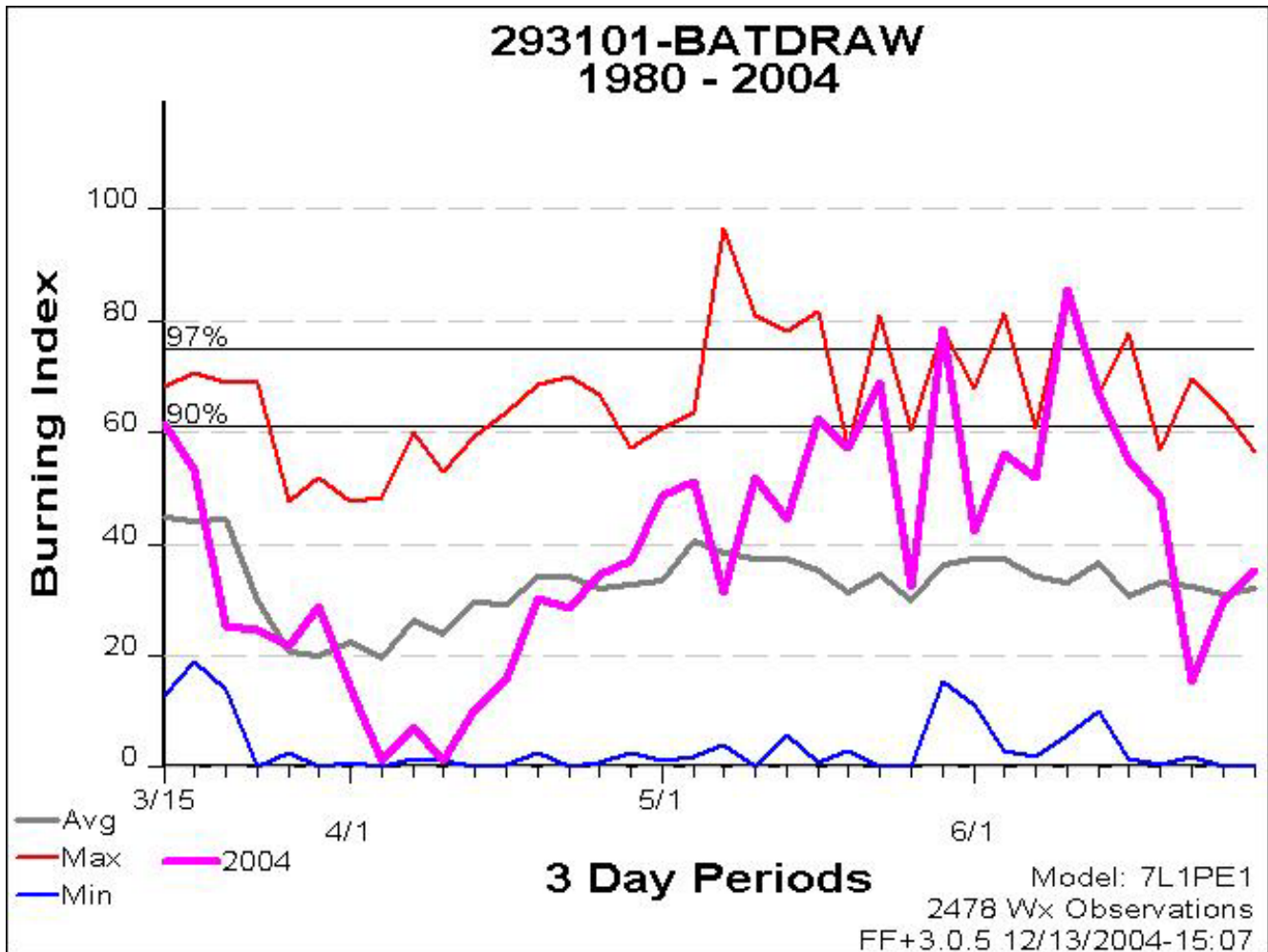
#### **d. Fire Weather and Fire Danger**

**1. Park Weather Station:** The park maintains a remote automatic weather station (RAWS) near the park's maintenance area. The Batdraw station (#293101) is located to be of representative value for both fire danger calculations and for area prescribed fire. The Handar 555 Data Collection Platform (installed in 2000) is National Fire Danger Rating System (NFDRS) Next compliant with hourly GOES telemetry. Data from this station is entered daily into the Weather Information Management System (WIMS) using NFDRS Fuel Model 7L (perennial grass). WIMS also calculates NFDRS indices for Fuel Models 7T and 7L that are used by the adjacent Lincoln National Forest.

Figure 4 is a FireFamily Plus graphic output of the average annual fire danger over many years at the Batdraw RAWS.



**Figure 4.** Fire Family Plus Graphic for Batdraw RAWS.



There are several other RAWS in southeast New Mexico and two at Guadalupe Mountains National Park that provide useful area fire weather data.

**2. National Fire Danger Rating System (NFDRS):** The NFDRS calculated Burning Index (BI) at the Batdraw RAWS is used exclusively for fire danger trend monitoring. The BI is the index most sensitive to wind speed and the most influential element in fire danger in grass fuels. New NFDRS staffing breakpoints are calculated yearly by the FMO using FireFamily Plus. The most recent breakpoints can be found in the *Preparedness Staffing Step-up Plan* (Appendix E).

Drought indices are best calculated using the Batdraw RAWS NFDRS calculated 1,000-hour time lag fuel moisture (TLFM). The park also uses measured live-fuel moistures as indicators of drought for prescribed fire purposes.

The Palmer Drought Index, while useful, uses airport weather data and the airports are all some distance from the park. The Keetch-Byram Drought Index does not work well in arid climates. The Energy Release Component is nearly meaningless as a measure of drought in light fuels such as grass.

Fire use and prescribed fire prescriptions both contain elements to account for drought. Typically, if the 1,000-hour TLFM index is under 8 percent there will be management concerns regarding controllability of wildland fire. Historic lows of this index of 5 percent coupled with even a little bit of wind have displayed uncontrollable extreme fire behavior (i.e., BI of 70+). This lack of controllability during the height of a droughty fire season has led the park to engage in prescribed fire activities during the cooler months. It has also led the park to suppress even lightning-caused ignitions during drought conditions as they often threatened to spread out of the park onto non-NPS lands.

**e. Preparedness Step-Up Staffing Plan:** The current park *Preparedness Step-up Staffing Plan* can be found in Appendix E. The step-up measures described in this plan are funded by the FIREPRO Primary Work Element E11, Emergency Presuppression.

### 3. Pre-Attack Plans

It is the responsibility of the FMO and the chief of resources stewardship and science to annually conduct an interdisciplinary meeting to update the park's wildland fire pre-attack plans (Appendix F). A pre-attack plan for suppression wildland fires should minimally consist of a WFIP Stage I and a WFSA completed for typical scenarios of human or lightning ignitions in the park. The primary consideration in all pre-attack plans will be firefighter and public safety. Additional pre-attack plan information is in Chapter IV-C.

### 4. Initial Attack

Initial attack (IA) will always deploy the appropriate management response, which are "specific actions taken in response to a wildland fire to implement protection and fire use objectives."

Initial attack of any wildland fire will always be documented with a Stage I WFIP as found in RM-18 and in the WPIRG.

Initial attack will always deploy an appropriate management response using suppression action consistent with firefighter and public safety and values to be protected. The aim of IA is to catch an ignition while it is still small and within the first 24-hour burn period. The park has the standard goal of a 95 percent success rate at initial attack and maintains two to three seasonal firefighters through FIREPRO staffing to statistically achieve this goal. At no time in IA will firefighter or public safety be compromised or risked unduly to protect any park resource or infrastructure.

All ignitions regardless of source in the park's Full Suppression Unit (FMU 1) will be suppressed. For ignitions within the Natural Fire Unit (FMU 2), the Stage I WFIP may point out a need to initiate IA as the appropriate management response.

**a. Information Used to Set IA priorities:** Initial attack suppression will routinely occur in the Full Suppression Unit and on all human caused ignitions. Priorities will be established based on the following concerns (in order of importance):

- Public and firefighter safety
- Threat to natural or cultural resources and park infrastructure
- Threat to park cooperator or private land
- Cost
- Air quality

**b. Criteria for Appropriate IA Response:** The park *General Management Plan* provides no guidance towards fire management policy other than to state that the park is actively engaged in fire planning for the Guadalupe Mountains on an interagency basis (page 81).

**c. Initial Attack Resources and Dispatching**

- **Resources:** The park has substantial involvement with all surrounding cooperators such as the BLM's Carlsbad Field Office, and the USFS's Guadalupe Ranger District. Most IA in the area involves an interagency response.

The park has two permanent firefighters and up to ten seasonal firefighters from March through July, as well as collateral duty firefighters.

The park maintains a well-stocked 20-person fire cache located at Guadalupe Mountains National Park. See Appendix I for a fire cache inventory.

Carlsbad Caverns and Guadalupe Mountains National Parks share one Type 6 engine, one Type 5 engine, one Type 3 engine, and two Type 3 water tenders.

- **Dispatching:** All IA dispatching is performed by the interagency Pecos Valley Dispatch located in Roswell and hosted by the BLM's Roswell Field Office. See Appendix J for a collection of cooperative agreements detailing mutual assistance in initial and extended attack of wildland fires.

**d. Confinement as an IA Suppression Strategy:** Confinement is acceptable as a suppression strategy particularly if safety of firefighters and cost of suppression versus values-at-risk are issues.

Confinement in the remote portions of the park may be the most acceptable means of suppression based on the Southwest Area Preparedness Level (Appendix G) at the time of the fire. A high preparedness level is usually the result of major fire activity in the Southwest, often in wildland/urban interface areas with high values at risk. Confinement may be the strategy of choice due to simple shortage of firefighting resources.

Confinement can be a strategic selection through the WFSA process when the fire is expected to exceed initial attack capability or planned management capability.

Confinement can only be used on fires along the park boundary if the affected park cooperator or neighbor is a co-signer of the WFSA detailing the terms of the confinement.

If confinement is considered for lightning ignited fires, they will normally be managed as WFUs.

Confinement may be acceptable as an appropriate strategy in the Full Suppression Unit.

**e. Typical Fire Response Times**

*During Fire Season (March-November):*

- Most of the Natural Fire Unit (FMU 2) can only be reached via several hours of hiking, or by helicopter.
- Most of the Full Suppression Unit (FMU 1) can be reached in less than an hour by graded road with engines.
- Hotshot or regular hand crews are typically no less than 4 hours away, if available.

- Helicopter(s) are typically one to several hours away.
- Heavy airtankers are located at Alamogordo and Albuquerque, New Mexico. Turnaround time from area tanker bases is over 90 minutes.
- Single engine airtankers are located in Sierra Blanca, New Mexico, during the fire season and have a 45-minute flight with a reload base in Carlsbad, New Mexico.

*During the off-season:*

- Times are usually longer due to lack of immediately available wheel or rotor resources. There are no airtankers available.

**f. Restrictions and Special Concerns for the FMUs:** The entire park has been identified as actual and potential habitat of the endangered Lee pincushion cactus.

The west end of the park has been identified as possibly containing multiple primary activity centers for Mexican spotted owl.

The Upper and Lower Painted Grottoes contain polychromatic pictographs that are likely sensitive to smoke and heat and are certainly sensitive to certain suppression activities.

Archeologists are concerned that fire could affect the accuracy of readings of carbon data at all archeological sites. They are also concerned about direct heat effects such as spalling on cliff shelters and pictographs.

Aerially applied retardants will only be used in initial or extended attack when approved on a case-by-case basis by the IC in consultation with the resource advisor. Determinations on whether or not to use retardant will place firefighter and public safety as the highest priority.

Refer to Section X, pages 62 – 65, for specific conservation measures.

## **5. Extended Attack and Large Fire Suppression**

**a. Determining Extended Attack Needs:** By definition, IA fires are handled by Type 4 and 5 incident management organizations. The key to both of these organizations (found in the complexity analysis process below) is that resources present to manage the fire are simple and of one kind (such as a squad or crew of firefighters, or two engines). The mixing of different types of resources such as engines, handcrews, and aircraft coupled with longer periods of time necessary to achieve control are typically the reasons for stepping up to an extended attack (i.e., Types 2 and 3) incident management organization.

**b. Implementation Plan Requirements – WFSA Development:** By policy, the Wildland Fire Situation Analysis (WFSA) process found in RM-18 (Chapter 9, and also in the WPIRG) is used to document strategic and tactical decisions regarding extended attack fires. The WFSA process can also be found as part of the Wildland Fire Assessment software package for which the NPS has licensed ownership.

Upon arrival of an incident management team to a park wildland fire, the park will minimally provide a draft WFSA for the team to complete.

Wildland Fire Situation Analyses must be reviewed and approved daily by the superintendent until a wildland fire has been declared controlled. Superintendents may approve up to \$2,000,000 in fire costs. Intermountain Regional Office (IMR) approval will be needed after

\$2,000,000. If the WFSA is above \$5,000,000, it will need to go from the IMR to the national office in Washington, DC, for review and approval.

**c. Complexity Analysis Process – IA to Extended Attack:** The complexity analysis process in RM-18 (Chapter 9, Exhibit 2) is designed to help guide a decision to step-up incident management to an extended attack or Type 3 incident management organization. The criteria for transitioning from initial to extended attack is that complexity has increased due to mixing of types of resources and increased number of resources.

**d. Limited Delegation of Authority for the IC:** The Limited Delegation of Authority is the superintendent's direction to an incident management team regarding management of a wildland fire. It is part of the briefing package presented to the team by the superintendent. A sample Limited Delegation of Authority for Carlsbad Caverns National Park is in the *Briefing Package for Incoming Incident Management Team*, Appendix K.

## **6. Wildland Fire Use to Suppression: Exceeding Existing WFIP – Selecting a New Strategy**

The conditions that cause an existing WFIP to be exceeded include threats to the park boundary, increased demand on area firefighting resources, increased impacts of smoke on air quality, and political concerns.

Should a WFU require placement into a full suppression strategy, the WFIP will be terminated and a Wildland Fire Situation Analysis (WFSA) begun.

The superintendent will then begin the procedures for an extended attack detailed above. This should minimally include selection of an IC and the completion of a complexity analysis.

Minimum impact suppression tactics will always be deployed in any suppression action on any fire of any size.

Minimum impact suppression tactics guidelines for Carlsbad Caverns National Park is in the *Briefing Package for Incoming Incident Management Team (IMT)*, Appendix K.

## **7. Rehabilitation**

The chief of resources stewardship and science will make recommendations to the FMO regarding rehabilitation actions that may be necessary after suppression actions. These recommendations will be made in the form of a rehabilitation plan, and, if an IMT is present, will be made to allow the IMT sufficient time to implement them prior to team demobilization. Completion of these recommended actions will then be the shared responsibility of the FMO and the IMT, if present.

Reseeding or revegetation after wildfires requires the prior written approval of the regional director.

## **8. Fire Reporting**

Incident Status Summary forms (ICS-209) will be completed by the IC no later than 1800 (6 p.m.) each day for all Class D and larger wildfires. These will be faxed or e-mailed immediately to the LNZ.

A master log of all wildfire suppression activities (other than those that involve an IMT) will be maintained in the office of the FMO by the fire program management assistant. From this master record all wildfire-related forms and timekeeping records will be generated. Completion of the Individual Fire Report form (DI-1202) will be the shared responsibility of the FMO and the IC.

Individual Fire Report forms (DI-1202s) will be entered expeditiously by the FMO/fire program management assistant into the Fire Reporting Module of the Shared Applications Computer System (SACS). All DI-1202s for a calendar year will be entered into this system no later than 10 days following the fire being declared out.

**C. Wildland Fire Use Guidelines**

*“Wildland Fire Use must be based soundly on management objectives (public and firefighter safety, cultural and natural resource objectives, etc.) and may include the full range of fire management strategies on a fire’s entire perimeter.”* (RM-18, Wildland Fire Management Reference Manual)

**1. The Objectives of Wildland Fire Use**

**a. Historical Natural Fire Regimes:** The Historical Natural Fire Regime concept takes ecoregion, vegetation, fire frequency, fire intensity, and other empirical data (Heinselman 1981, Schmidt et al. 2002) and produces five categories of fire regime. (Table 1.)

**Table 1.** Historical Natural Fire Regimes (Schmidt et al. 2002)

Code	Description
I	0-35 year frequency*, low severity**
II	0-35 year frequency, stand-replacement severity
III	35-100+ year frequency, mixed severity
IV	35-100+ year frequency, stand-replacement severity
V	200+ year frequency, stand-replacement severity

\*Fire frequency is the average number of years between fires

\*\*Severity is the effect of the fire on the dominant over story vegetation

There is a great deal of evidence, and research (Schmidt et al. 2002, Kuchler 1975, National Academy of Public Administration 2002) to support that the Guadalupe Mountains fall under Historical Natural Fire Regime I.

Studies completed in similar vegetation (Wright, Britton et al.) to the east of this area have shown a very definite high frequency, low severity fire regime with many adaptations evident in the vegetation. The pinõn-juniper and oak species in those studies are very resilient in being able to respond quickly and resprout after low intensity range fires. Additionally, Hann and Bunnell (2001) discuss fire regimes specific to grassland/savannah vegetation types. The modeling assumption for Fire Regime I is *“open forest or savannah structures maintained by frequent fire; also includes mixed severity fires that create a mosaic of different age post fire open forest, early to mid-seral forest structural stages, and shrub or herb dominated patches....”* This describes almost perfectly the mosaic of vegetation in some areas of the Guadalupe Mountains where fire intervals have not been too long.

**b. Fire Regime Current Condition Class:** Fire regime current condition classes are a qualitative measure describing the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure, and fuel loadings. One or more of the following activities may have caused this departure: fire suppression, timber harvesting, livestock grazing, introduction and establishment of exotic plant species, introduced insects or disease, or other management activities.

**Table 2.** Fire Regime Current Condition Class Descriptions (National Academy of Public Administration 2002)

---

**Condition Class and Description**

---

**Condition Class 1. *Low Risk:*** Ecosystems in this fire class are mainly within their historical fire regimes. Fires within these ecosystems generally pose little risk and have a positive impact on the biodiversity as well as soil and water quality. However, there is a need for maintenance management in order to prevent these lands from degradation. Such maintenance can be achieved by fire use methods.

**Condition Class 2. *Moderate Risk:*** The risk of losing key ecological components due to occurrence of fire is moderate in this class. The fire regimes have been moderately altered from their historical range by decreased fire frequency, resulting in excessive accumulation of understory vegetation. If not treated, those fuel buildups might result in more intense fires that are more difficult and costly to suppress, and have negative impact on biodiversity as well as water and soil quality. Thus, fuel treatments, such as fire or thinning, are needed to restore the original condition of these lands and to reduce the risks of destructive wildland fires.

**Condition Class 3. *High Risk:*** Fire regimes have been significantly altered from their historical range, resulting in high risk of losing key ecosystem components if fire occurs. Fire return intervals have been increased or decreased by multiples, leading to dramatic changes in landscape patterns. Excessive accumulation of dead vegetation and large quantities of small trees that grow densely among the larger ones can lead to severe, high intensity wildland fires. Within this class, characteristic for short interval, fire adapted ecosystems, wildland fires damage not only all trees but also can lead to serious erosion and water contamination. Fire use methods should be used cautiously in those areas; prescribed fire should be done after mechanical or hand treatments, or during periods of benign fire behavior.

---

There has been a great deal of discussion by park biologists regarding the prevailing condition class of much of Carlsbad Caverns National Park. There is little doubt that the vegetation of the park has suffered considerable change in the past 80 years due to both heavy grazing and the suppression of wildland fires. While some areas of the park have seen a return of large wildland fires, it is likely that the majority of the park falls into Condition Class 2 or even 3.

## **2. Parameters for Informed Management Decisions – Wildland Fire Use**

Any natural (lightning) ignition occurring within the Natural Fire Unit (FMU 2) and remaining within all prescription parameters listed here will be allowed to burn as a WFU. The WFIP process as detailed in the (WPIRG) will be the basis for all decision making and documentation regarding the certification of WFUs.

**a. Fuel Moisture/Fire Weather Information:** The park regularly gathers fuel moisture and fire weather information that may be useful in the certification of WFUs. Samples of fuel are oven-dried by fire effects monitors and fuel moisture percent distributed through the fire management office. The park also gathers fire weather data from the Batdraw RAWS (#293101) and surrounding RAWS stations and processes it daily through the NFDRS using Fuel Model 7L1P1.

**b. Specific Parameters:** Some parameters specific to Carlsbad Caverns National Park's certification of wildland fire use (WFU) fires are as follows:

- Wildland fire use is not allowed in the full suppression unit (FMU 1).

- Wildland fire use fires that threaten to leave the park must either be accepted as a WFU by the park neighbor or placed in a suppression strategy.
- Wildland fire use in Regional Preparedness Levels IV and V require regional approval
- There are no specific limits for certification based on the burning index, energy release component, drought indicators, etc.
- A WFU may be certified at any time of year, but caution may be required through the risk analysis for WFUs in May or June.

**c. The Stage I WFIP:** A Stage I WFIP is required for all wildfire ignitions. It is to be completed within eight hours of discovery of each new ignition.

The Stage I WFIP is the preliminary stage of the WFIP and establishes a documentation framework for further stages. It is both an information gathering stage and decision-making stage. This information provides location, fire cause, administrative information, fuel and weather conditions, and fire behavior information. It consists of the fire situation, go/no-go decision criteria checklist, and recommended response action. It aids agency administrators in making the initial decision to manage a fire for resource benefits or to suppress by providing location of the fire, cause of fire (human- or natural-caused), and validation of the wildland fire use decision (go/no-go decision).

There are five main categories of parameters considered in the Stage I WFIP. They are listed on the decision criteria checklist and are 1) safety of life and property, 2) cultural and natural resource concerns, 3) risk analysis, 4) fire management resource availability, and 5) agency administrator issues.

An answer of *yes* to any of the decision criteria checklist questions listed below, results in a *no-go* decision resulting in an IA/suppression action.

- **Safety of Life and Property:** Is there a threat to life, property, or resources that cannot be mitigated? Consider threats to:
  - Firefighters
  - Visitors
  - Park neighbors
  - Infrastructure
  - Cultural or natural resources (see conservation measures on pages 61 – 65)

The key here is the threat cannot be mitigated (or can it?).

- **Cultural and Natural Resource Concerns:** Are potential effects on cultural and natural resources outside the range of acceptable effects?

The cultural resource component (Appendix Q) for this plan identifies specific values and objectives for preserving and maintaining cultural resources in a desired state with regard to fire management strategies. Values are defined as the unique research and interpretive potential of cultural resources that are at risk from fire program activities. Objectives have been defined by considering possible fire management strategies and how each strategy might be used to benefit, maintain, or limit the loss of core values.



The potential effects on cultural resources are within the range of acceptable effects if the stipulations in Appendix Q are followed.

It has been accepted that certain impacts are likely to occur, at least in the short term and to individual plants and animals. In its biological assessment for the three federally listed species, the park stated that the preferred alternative is “likely to adversely affect” the Mexican spotted owl (federally threatened), Lee pincushion cactus (federally threatened), and Sneed pincushion cactus (federally endangered). It also stated that the long-term effects of restoring natural fire to the system would benefit all species.

In the biological opinion, the US Fish and Wildlife Service (USFWS) “anticipates incidental take” of a few individuals as a result of plan implementation. In order to minimize the take, the biological opinion identifies several *reasonable and prudent measures* with detailed *terms and conditions* for their implementation.

Implementation of these non-discretionary terms and conditions constitutes mitigation, and renders the impacts “acceptable” in this context.

- **Risk Analysis:** Are relative risk indicators and/or risk assessment results unacceptable to the appropriate agency administrator? Consider risk factors such as:
  - Fire danger indicator
  - Time of fire season (i.e., how close to a normal season-ending event)
  - Fire size
  - Potential complexity
  - Drought indicators

The Wildland Fire Relative Risk Rating matrix found in the WPIRG serves as a risk assessment and should always be completed as part of a Stage I WFIP. There is always going to be some degree of risk associated with wildland fire use. The key here: is the risk unacceptable?

- **Fire Management Resource Availability:** Is there other proximate fire activity that precludes successful management of this fire? Consider:
  - Zone and regional wildland fire preparedness level
  - Availability of fire use manager and team
  - Fire activity in immediate neighborhood
  - Draw down of local resources
- **Agency Administrator Issues:** Are there other agency administrator issues that preclude wildland fire use? Consider:
  - Political constraints
  - Moratoriums
  - Funding issues
  - Efficiency issues
- **Monitoring:** All WFUs under a Stage I WFIP will be monitored at the discretion of the superintendent and/or FMO who will delegate to the IC/FUMA a monitoring frequency

based upon the needs of the specific fire when under a Stage I WFIP. The number of WFUs in the park at any given time must not exceed the park's ability to manage them. (See Chapter VI – Monitoring and Evaluation)

**d. The Stage II WFIP:** A Stage II WFIP will provide managers and staff with information to continue management of the WFU. It includes validation of short-term implementation actions as a decision. This stage will provide predictions of where the fire may go, how intense it may burn, how fast it may spread, what the necessary short-term actions are, what the full complexity is, and if long-term management actions need to be addressed immediately.

A Stage II WFIP will be initiated for any WFU that persists in growth to the point of requiring mitigation, holding, or other implementation action.

A Stage II WFIP must be completed within 48 hours of indication of its need (see the WPIRG). This should minimally include fire behavior predictions, a short-term risk assessment, short-term implementation actions, a complexity analysis, and a Stage III Needs Assessment Chart. The need for periodic reevaluation and revalidation is a key component of the Stage II WFIP.

The park superintendent or his designated acting will need to revalidate the Stage II WFIP every day with their signature. It is recommended that these officials have attended a Fire Management for Agency Administrators course. Information needed by the superintendent includes WFIPs projecting costs greater than \$500,000 that require IMR concurrence prior to approval, and greater than \$2,000,000 that require Washington Office approval.

**e. The Stage III WFIP:** The Stage III WFIP supplements the fire management plan by providing the full long-term implementation actions necessary to manage the wildland fire to accomplish identified objectives. This stage will provide a definition of the ultimate acceptable geographic size of the fire (represented by the maximum manageable area). It will consider long-term fire behavior predictions and long term risk assessment. It will assess the likelihood of the fire reaching the maximum manageable area perimeter, and will document those operational management actions necessary to manage long duration fires that will need mitigating measures to strengthen and defend the maximum manageable area.

Completion of a Stage III Needs Assessment Chart as detailed in the WPIRG will indicate the need for a Stage III WFIP.

It is strongly suggested that if a Stage III WFIP must be completed for wildland fire use, a Fire Use Team be ordered. The technical requirements of the Stage III assessment requires a combination of technical experts only found on organized Fire Use Teams.

A Stage III WFIP must be completed within seven days of indication of its need. This should minimally include MMA determination, a long-term risk assessment, and development of long-term implementation actions.

**f. Wildland Fire Use Approval Authority:** The superintendent has the ultimate responsibility for approving or for not approving the continuation of a WFU. The FUMA for each WFU has the responsibility for monitoring fire's smoke production and fire behavior and for making recommendations to the superintendent. He/she may be assisted by one or more prescribed fire monitors for each individual WFU.

**g. Minimum Impact Suppression Tactics:** Holding actions may be undertaken to confine WFUs to certain areas. They must be fully described in the WFIP and are subject to all of the constraints on suppression tactics (i.e., Minimum Impact Suppression Tactics (MIST)) described in Appendix K of this plan.

**h. Air Quality:** A burn permit must be obtained from the State of New Mexico, Environmental Improvement Division (EID) for any WFU that produces or is expected to produce a substantial amount of smoke. The EID is legally embodied to deny or revoke burn permits for WFUs that produce unacceptable amounts of smoke. For more information, see the New Mexico Smoke Management Memorandum of Agreement in Appendix J.

**i. Placing a WFU under Suppression Strategy:** Any WFU that is declared an unwanted fire cannot later be declared a WFU a second time. It must continue to be managed in a suppression strategy. A WFSA is to be prepared when it is necessary to convert a WFU to a suppression fire.

### 3. Preplanned Wildland Fire Use Implementation Procedures

It is the responsibility of the FMO and the chief of resources stewardship and science to annually conduct an interdisciplinary meeting to update the park's wildland fire pre-attack plans (Appendix F). A pre-attack plan for wildland fire use should minimally consist of a WFIP (Stages I, II and III) completed for typical scenarios of lightning ignitions in the Natural Fire zone of the park as well as maps and known hazards of the area.

WFIPs from actual WFUs can also serve as good pre-attack plans for future WFUs and should also be included in Appendix F.

These pre-attack plans, if properly completed through Stage III for representative scenarios, should serve well as templates for any subsequent ignitions.

The primary consideration in all pre-attack plans will be firefighter and public safety.

### 4. Description of All Wildland Fire Use Procedures not Preplanned

**a. Periodic Assessment:** Until declared out, any WFU will be periodically assessed. This assessment is documented by the superintendent on the Periodic Fire Assessment form found in the WPIRG.

**b. Outlines and Requirements for the WFIP:** The most current version of the WPIRG will be the basis for completion of WFIPs. As there will certainly be rewrites and additions to this guide and the forms it contains the FMO/FUMA will use the most current version and follow the most current procedures.

The Stages I, II and III WFIP procedures are described in some detail in Section 2 (above). Refer to the current WPIRG for full details and updated information.

### 5. Potential Impacts of Plan Implementation

*Issue 1 (Life and Property):* Fire is an effective tool for reducing hazard fuels, but can pose a threat to firefighters, park staff, developed areas, and the public. Safety is the greatest consideration. The FMP dictates actions for contingencies when life and property are threatened. All alternatives would apply nonfire treatments to reduce fuels around sensitive areas only. Minor, adverse short-term effects would ultimately result in minor, beneficial long-term effects as risks are reduced. Initially an increase in wildland fire use would result in short-term minor adverse impacts to public

safety and property. This alternative offers the greatest long-term risk reduction as fuels are reduced.

*Issue 2 (Park Neighbors):* Park neighbors are concerned with fire crossing park boundaries. Although fire may threaten to burn across boundaries, threatening neighboring property, prescribed burns to reduce fuel loads ultimately minimize risk of wildland fire damage. The park is diligent about informing interested parties of pending burns. Minor, adverse short-term effects would ultimately result in major, beneficial long-term effects as risks are reduced. This alternative reduces the long-term potential for unwanted fires to escape the park, or enter the park from neighboring lands by reducing fuel loads. Interagency collaboration is needed.

*Issue 3 (Tourism):* Local businesses may experience temporary declines in business if park visitation declines due to fire. Wildland fire use and prescribed fire decrease the chance for catastrophic fire that would affect tourism in a negative way. Minor, beneficial impacts over the long-term as biodiversity is maintained and fuel loads are reduced. Short-term, adverse effects to local businesses are possible from visitor use restrictions, but effects should be minor due to availability of other local destinations. Intensity of effects is directly related to fire size, severity and location. The likelihood of closure due to catastrophic fire events decreases in the long-term with increased fire use and prescribed fire.

*Issue 4 (Cultural Resources):* Unknown or unprotected historic structures and artifacts may incur damage directly from fire or from suppression activities. Thinning, prescribed burning, and wildland fire use will reduce fuel buildup near structures and sites. Appropriate management response (suppression) will be dictated for the most sensitive areas within the park. There is potential for minor adverse impact by allowing fires to burn over most of the park. Some adverse suppression impacts are likely. Cultural resources benefit over the long-term from reduction of fuel loads in and around sites. There is less potential for disturbance because of suppression actions. The likelihood of harmful fires decreases in the long term as park-wide resource management objectives for fuel reduction are met.

*Issue 5 (Changes in Landscape-Scale Vegetation Patterns):* Fire may change the landscape, altering ecosystem functioning and the present “look” of the park. Plant communities are adapted to naturally occurring wildfire that helps remove fuel buildup. Some vegetation naturally experiences infrequent stand-replacing fires. Prescribed burning provides more control over fire intensity and effects. There is possible minor short-term adverse impacts; also minor to moderate long-term benefits. Criteria permitting prescribed and wildland fire use maintain or enhance park resources and reduce fuels. Catastrophic fire threat is lessened in the long term as resource objectives for fuel reduction are met. Greater potential for moderate long-term benefits exists.

*Issue 6 (Wildlife Habitat Change):* Fire has the potential to harm or change wildlife habitat, causing some species to decrease in abundance and others to become more abundant. Prescribed burning and wildland fire use allow for more control over fire. Low to moderate-intensity fire thins crowded stands, maintains habitat mosaics, and reduces fuel loading that can contribute to catastrophic wildland fire. Short-term minor adverse impacts are expected for some species, short-term minor beneficial impacts for others. Overall there should be minor to moderate long-term benefits as natural habitats are restored. Current knowledge and capability can minimize adverse effects while allowing wildland fires for resource benefit to occur. Increased Wildland Fire Use would affect plants and animals intolerant of fire, but would benefit the ecosystem in the long-term. This alternative has the greatest likelihood of long-term benefits as fuel loads are reduced and natural wildland fire is restored.

*Issue 7 (Special-Status Species):* Fire management activities may affect threatened, endangered, or sensitive species. Low-intensity prescribed fires and wildland fire use can be conducted to minimize damage, but some adverse impacts may be necessary in the short term to achieve long-term benefits from fire renewed habitats and fuel reduction. Long-term effects are minor and beneficial; short-term effects are minor or moderately adverse. Wildland fire use and prescribed fire may directly and adversely affect individual plants and animals, but they can benefit sensitive species in the long-term. All practical mitigation and minimization actions are undertaken to reduce impacts. Increased Wildland Fire Use would best reduce the potential for catastrophic wildland fires, benefiting many species in the long term.

*Issue 8 (Exotic Species):* Prescribed and wildland fire, mechanical fuel reduction, and suppression activities may promote certain exotic species that invade disturbed areas. Fires and suppression activities both create disturbances that may promote spread of exotic plants. Research programs can increase our understanding of fire effects on exotic species. Mitigation measures are important. Minor short-term adverse impacts are expected. The potential for exotic plant spread exists both from allowing fires to burn, which clears areas for colonization, and from ground disturbances during suppression actions. With less suppression and more wildland fire use, potential habitat for some exotic plants may increase but chances of their being spread by humans may decrease.

## **6. Staffing Requirements for WFU**

The park will endeavor to maintain at least one, preferably two, FUMA-qualified individuals. For Stage I and Stage II WFUs, this should be sufficient to provide a proper level of management when augmented with interagency and other park wildland fire qualified individuals.

It is strongly suggested that if a Stage III WFIP must be completed for a WFU, a Fire Use Team be ordered. The technical requirements of the Stage III assessment requires a combination of technical experts only found on organized Fire Use Teams.

Appendix E is the park *Preparedness Staffing/Step-up Plan*. Wildland fire use is allowed in all five levels of park preparedness; however, it is likely that in the higher levels, either the WFIP process or the Southwest Area Preparedness Level (see below) will preclude wildland fire use.

Appendix G (the Southwest Area Preparedness Levels) contains important information for the decision making process in the Stage I WFIP for certification of a wildland fire use. An example is the statement in Preparedness Level IV that the Zone Fire Management Board will “*Limit prescribed fires and fire use fires (WFU) to those certified by the agency administrator to have little chance of requiring suppression resources beyond those committed on the unit.*”

## **7. Public Information and Interpretation Related to WFU**

The park has a public affairs specialist who will work with the FMO/FUMA to disseminate information regarding Stage I or II WFUs. Stage III WFUs will likely trigger the ordering of a Fire Use Team and they normally come with a qualified fire information officer.

During the implementation of a Stage III WFIP, the public and key constituents will be informed of wildland fire use policies.

Fire information officers assigned to the fire, the park’s public affairs specialist, and any qualified information officers on the park’s staff will work together to inform and educate park interpreters and other front-line staff about the current fire situations through news releases and personal contacts. Front-line staff will in turn inform visitors of the fire situation in the park.

Fire information and public affairs staff will work together to keep key constituents at the local, agency, interagency, state and national level (depending on the size and location of the fire) informed of fire developments and the reasoning behind management decisions. The park's public affairs specialist will maintain a list of these key contacts.

## 8. Standard Records for Wildland Fire Use

**a. Planning Documents:** The WFIP and a Wildland Fire Report (DI-1202) are required documentation for all WFUs. They will be filed in the fire management office as part of the final project package. A WFSAs, if completed, should also be filed in this package.

**b. Monitoring Reports:** Monitoring requirements and reports are detailed in the *Wildland and Prescribed Fire Monitoring Plan* in Appendix O. While monitoring records are part of the permanent project record, it is not necessary to store all of them physically with the final project package. They will remain filed with the fire effects monitors or fire ecologist.

A summary of monitoring actions taken for each WFU should be filed with the final project package.

**c. Revalidation and Certification Documents:** Revalidation and certification documents, such as the Periodic Fire Assessment, must be filed with the final project package.

**d. Funding Codes Used and Financial Records:** Funding codes are assigned by the fire management office, which is also where all financial records are stored.

**e. Fire Progress Maps:** A set of fire progress maps will be kept with all wildland fire use documentation.

**f. Photo Point Series:** All photo point series of fire progression will be kept in the respective wildland fire use documentation package.

**g. Funding and Fiscal Tracking:** All funding issues and fiscal tracking are completed by the FMO and his/her staff.

## D. Prescribed Fire

The goal of the prescribed fire program in Carlsbad Caverns National Park is to employ fire to reestablish and to maintain natural vegetation communities with minimum risk of fire escape, with total cooperation with park neighbors where possible, with minimum damage to natural and cultural resources, and at an acceptable cost.

The park's prescribed fire management efforts will consist of a careful application of fire to achieve resource management goals utilizing (1) wildland fire use and (2) prescribed burns. All WFUs and prescribed burns will be conducted consistent with all policies and laws such as RM-18 Fire Management Guidelines, the Endangered Species Act, the Wilderness Act, and other pertinent federal or state laws pertaining to endangered species, air quality, or public safety.

Except in the lands below the escarpment, the terrain is generally remote and extremely rugged, containing cliffs, ridges, and steep canyon walls. Most rock outcrops consist of exfoliating limestone and large pieces can readily be broken loose. In addition, poisonous spiders, insects, and reptiles are abundant. Since the risk of personal injury increases dramatically at night, the park will limit nighttime prescribed fire operations to passive monitoring activities.

**1. Prescribed Fire Guidelines:** Guidelines specific to Carlsbad Caverns National Park for prescribed burns are as follows:

- Prescribed burns will be utilized as a means to return the park's vegetation composition to a species composition that more closely represents what was present at the advent of Europeans to the area.
- Fuel loads are artificially high in some areas of the park (especially near developed areas and canyon bottoms). Should these areas burn uncontrolled under extreme conditions, developed areas and cultural resources could be damaged and soil and vegetative damage could result from too intense of a fire. The park must burn the fuels in these areas under less intensity-producing prescription.
- Prescribed burns may be used to conduct fire research necessary to obtain information needed to better manage the park.
- Prescribed burns may be used to create defensible space fire breaks for proposed future prescribed or natural fires, or to protect developed/cultural/natural resource areas.

## **2. Planning and Documentation**

Some general guidelines for all NPS areas that are excerpted from RM-18 and from regional guidelines are as follows:

- Each prescribed burn will be planned by writing a prescribed fire plan, that contains all the information in the suggested plan format found in Appendix M. The sample format is an adaptation from RM-18, Chapter 10. A fire prescription will be clearly stated in each prescribed fire plan and will strictly govern the decision to ignite and/or allow prescribed fires to burn. The prescription will be a specific statement defining the conditions of temperature, humidity, wind direction, and speed and fuel moistures under which the fire will be allowed to burn. The prescription will specify acceptable ranges of these various indices and will also specify the limit of the geographic area to be covered and the nearby and regional resources that must be available in case immediate suppression becomes necessary.
- All new prescribed fire plans or amendments to existing plans must be approved by the superintendent. Plans not executed during a calendar year must go through the approval process the next year.
- All prescribed burn projects must be documented in the National Fire Plan Operations and Reporting System at the time the prescribed fire is proposed. If funds are to be requested for the project, these requests must be made in the same module prior to August 15 of the fiscal year previous to the one the project is planned for. Follow-up entries must be made upon completion of the project. A complete description of this documentation process can be found in RM-18, and in the *Users Guide for the FIREPRO Budget Analysis Subsystem*.
- All prescribed burns must be documented on an Individual Fire Report form (DI-1202) according to instructions that are found in the park's mobilization guide. These forms must then be entered no later than five days following the fire being declared out to the fire reporting module of the SACS.
- Prior to any prescribed burn, the FMO will ensure that the chief of resources stewardship and science and the superintendent, Lincoln Zone Coordination Center (LNZ), and all affected neighboring agencies and landowners are alerted. All prescribed fires will be

conducted in compliance with the *New Mexico State Air Quality Implementation Plan* requirements and appropriate permits will be secured.

- A Prescribed Burn Complexity Analysis (Appendix M or RM-18 Chapter 10) will be completed with each prescribed fire plan. For all burns, simple or complex, the positions of burn boss, ignition specialist and holding specialist must be filled with separate fully qualified persons. Trainees may be used to meet training objectives, but must be supervised by fully qualified personnel. All available expertise may be utilized in the planning stages.
- At least 14 days of fire weather data will be gathered on or very near the site prior to any prescribed burn so that fuel moisture and other indices provided by the NFDRS will be as accurate as possible. The Batdraw RAWS (#293101) will also be utilized.
- Prescribed burns will not be ignited if the Southwest Region Preparedness Level (Appendix G) reaches or exceeds Preparedness Level IV. Prescribed burns that are in progress will be allowed to burn in Regional Preparedness Level III, but may be suppressed in Preparedness Level IV or V.
- Fire weather and behavior will be monitored during all prescribed burns, and fire effects on the resources will be documented and permanently filed after the burn. The *Western Region Fire Monitoring Handbook* will be used as a basis for fire behavior and effects monitoring.
- Any prescribed burn that escapes its predetermined boundaries will be declared an unwanted fire by the burn boss if initial holding actions are not immediately successful.
- All prescribed burns will be continually checked until declared out.

### **3. Prescribed Fire Program Human Resources**

The park is currently authorized by FIREPRO analysis one permanent FMO, one permanent fire program management assistant, one permanent cache manager/engine foreman (all currently stationed at Guadalupe National Park), one permanent engine foreman stationed at Carlsbad Caverns, one subject-to-furlough fuels technician and five seasonal forestry technician positions. The seasonal positions are usually filled from April into August for seven pay periods (14 weeks).

Personnel qualifications and staffing organization for prescribed fire functions will follow current NPS policy as described in NPS-18, and regional policy as described in the *Southwest Region Prescribed Fire Monitoring Guide*. In order to have the minimum number of prescribed fire personnel necessary to carry out complex prescribed burns, the park must have employees qualified in the following positions:



<u>Number of Employees</u>	<u>Rating</u>
1	Fire Use Manager
2	Prescribed Fire Burn Boss II
2	Holding Specialist
2	Ignition Specialist
2	Fire Effects Monitors
12	Prescribed Fire Crew Member

Specific employees will be identified and targeted for training opportunities in order to achieve the desired levels of expertise. Qualified seasonal employees will be trained and added to the teams each year.

Firefighter and prescribed fire crew member qualifications are essentially the same. Thus having 18 to 24 firefighters available is the same as having 18 to 24 prescribed fire crew members available.

#### 4. Air Quality and Smoke Management

**a. Pertinent Air Quality Issues:** Air quality is a major issue as the park is a Class I airshed. Resources in Class I areas, which have relatively pristine air quality, receive special protection against air pollution. The protected resources are referred to as air quality related values (AQRV) and include the health of people and plants and visibility. The park’s air quality and AQRVs are protected by Clean Air Act provisions that allow only limited increases over baseline concentrations of ambient air pollutants such as sulfur dioxide (SO<sub>2</sub>), carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), and particulate matter (PM).

The area is considered in attainment for all National Ambient Air Quality Standard (NAAQS) pollutants (i.e., ambient concentrations of SO<sub>2</sub>, CO, NO<sub>x</sub>, PM, ozone, and lead) are below Clean Air Act standards for these pollutants (Ball 2002 pers. comm.).

The Environmental Protection Agency has set NAAQSs for certain pollutants produced by wildland fire. These include:

*Particulate Matter:* Particles under ten microns in diameter can enter the airways and cause lung damage. Firefighters should take precautions to avoid inhalation of minute particles.

*Oxides of Sulfur and Nitrogen:* Large amounts of nitrogen and small amounts of sulfur are contained in forest fuels and combine to form oxides during burning. Fortunately, the amounts produced in wildland burning are not considered significant.

*Carbon Monoxide (CO):* Carbon monoxide is present in high concentrations in the immediate vicinity of a fire; however, it disperses very quickly and would be of minimal risk to the public, even a short distance from the fire. Firefighters can be affected and should take proper safety measures to avoid CO inhalation.

*Ozone:* Under certain conditions ozone can be formed during fire. This occurs in the upper part of the smoke column and therefore is not a threat to people near the fire. It can cause a problem downwind if the area affected already has high ozone levels.

There are also potentially harmful non-criteria pollutants, for which standards have not been set, that are contained in wood smoke. These include:

*Aldehydes:* Two chemicals in this group are acrolein and formaldehyde. Acrolein has a severe toxic effect on cells and can reduce the body's ability to ward off respiratory infection. Formaldehyde can irritate the eyes and throat and interfere with breathing.

*Polynuclear Aromatic Hydrocarbons:* Some polynuclear aromatic hydrocarbons are carcinogenic and can be inhaled as minute particles. They are of little threat to the public but could have long-term impact on firefighters.

#### **b. Smoke Management Planning and Implementation Measures**

The fire management program for the park will be in full compliance with interstate, state, and local air pollution control regulations as required by the Clean Air Act, Title 42, United States Code 7418. All prescribed burns will be registered with the New Mexico Environment Department (NMED), Air Quality Division (per 20 NMAC 2.60, 113). In addition, measures will be taken to protect smoke-sensitive areas in and around the park. These include the visitor center and the Rattlesnake Springs Picnic area. Monitoring of smoke from prescribed fires will occur according to NMED requirements. The eastern one-third of the park is adjacent to Whites City and the prevailing westerly wind will usually carry smoke in that direction. The park entrance road is in this area and road visibility is also of concern. Fires in the western two thirds of the park may pose smoke management problems, depending on conditions at the time of the fire. Prescriptions for prescribed fires in this portion of the park will insure that winds are sufficiently strong enough or mixing heights high enough to disperse the smoke away from Whites City.

### **E. Non-Fire Fuel Treatment Applications**

#### **1. Mechanical Treatment**

In sensitive areas and highly overgrown areas, the use of prescribed fire treatment may not be practical or the best initial fuels management choice. In these cases, mechanical thinning using chainsaws and/or hand tools will be used to decrease fuel loads.

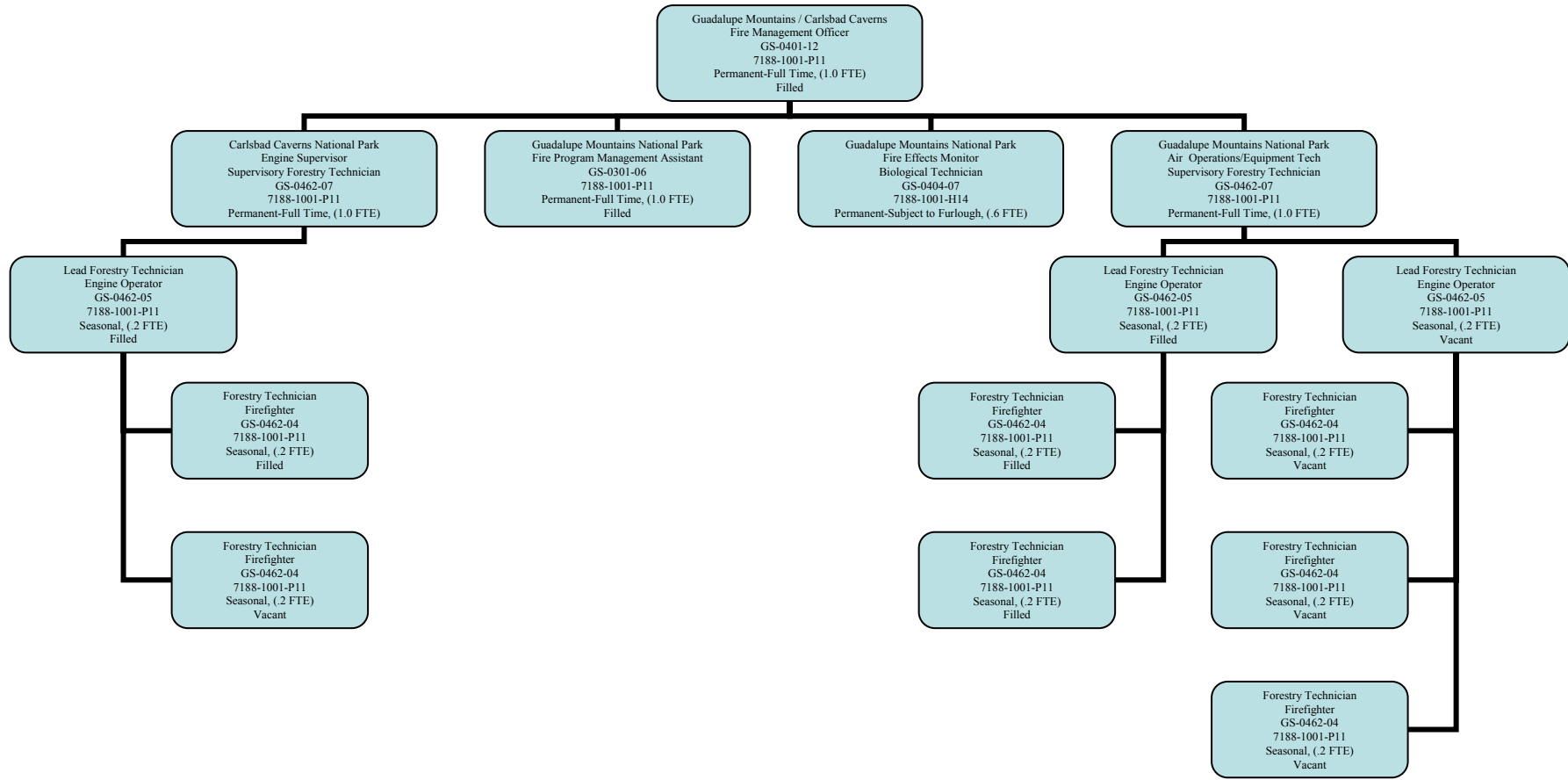
- a. Annual Program Activities:** The *Five-Year Fuels Treatment Plan* (Appendix P) details the annual program for manual thinning and/or prescribed burning in the park.
- b. Equipment and Seasonal Use Restrictions:** These restrictions are spelled out in the five-year plan. Seasonal restrictions would be used to protect nesting and breeding wildlife.
- c. Required Effects Monitoring:** A project-by-project determination will be made as to the level of monitoring necessary. Monitoring will range from pre- and post-project photographic documentation to implementation of standards in the NPS *Fire Monitoring Handbook* (2003).
- d. Critique of Mechanical Treatment Projects:** Upon completion of treatment, NPS staff will inspect the site to determine if specifications were sufficient to achieve resource management goals. Upon completion of the initial treatment, a maintenance schedule will be developed based upon inspection finding and long-term program objectives.
- e. Cost Accounting:** All costs charged to project will be tracked by the project manager and provided to the superintendent after completion of the project.
- f. Reporting and Documentation:** Project progress, accomplishments, completion reports, and compliance or consultation documentation will be entered into the computer system as required.
- g. Annual Planned Project List:** See Appendix P for the five-year plan for fuels treatment projects.

**F. Emergency Rehabilitation and Restoration**

There may be a need for short- and long-term rehabilitation following fire. Revegetation may be required where handlines were constructed or where soil and native vegetation were disturbed or other erosion control measures were utilized to minimize resource damage and other adverse impacts. Staff will consult with specialists (archeologists, hydrologists, plant ecologists, wildlife biologists, and fire ecologists) to determine the needed treatments; then write, implement, and monitor plans to accomplish them.

# V. Organizational and Budgetary Parameters

## A. FMO Organizational Structure



35

## **B. FIREPRO Funding**

Carlsbad Caverns and Guadalupe Mountains National Parks have separate FIREPRO analyses completed each year, and thus have separate FIREPRO budgets. Combined FIREPRO base funding is approximately \$455,000 each year not including funding for projects such as prescribed fire.

## **C. FMO Organization and Park Operations**

The fire management program is shared between both Guadalupe Mountains and Carlsbad Caverns National Parks. The FMO is directly supervised by the Guadalupe Mountains National Park chief ranger, who is directly supervised by the Guadalupe Mountains' superintendent.

## **D. Summary of Fire Management Responsibilities**

The following fire management responsibilities are assigned to various management positions in Carlsbad Caverns National Park:

### *Superintendent*

- As the chief executive within the park, the superintendent is responsible to the regional director for all fire management activities within the park.
- Approves and terminates local and zone fire management agreements.
- Signs delegation of authority for incident management teams and is the agency administrator.
- Approves the WFIP, thus certifying daily the management, continuation, or termination of park WFUs.
- Approves the WFSAs, thus approving upon their submittal the strategies chosen for the management of park wildland fires managed under a suppression strategy.
- Approves individual prescribed fire plans.
- Ensures that project compliance has been completed.
- Approves appendices to this plan.
- Conducts briefing sessions for incoming and outgoing incident management teams.
- Periodically assess and certify by signature that continued management of wildland fire use actions is acceptable. Under certain conditions, the superintendent may delegate this responsibility to another organizational level.

### *Public Affairs Specialist*

- Receives public inquiries and prepares pertinent news releases on fire management activities within the park. However, this activity will be closely coordinated with the fire information officer on wildfires requiring deployment of an interagency IMT.

### *Chief of Resources Stewardship and Science*

- Ensures the implementation of the park's fire management program as detailed in this plan.
- Ensures that project level interagency consultation is initiated/completed.
- Ensures that sensitive resources are being protected.
- Assists with the in-park procurement of personnel for all facets of fire management including pre-suppression, suppression, wildland fire use monitoring, management ignited prescribed fires, traffic control, etc.

- Assists in the coordination of fire restrictions in the park that may be imposed during prolonged periods of very high or extreme fire danger.
- Provides fire prevention information to subordinates, and works with the chief ranger and the chief of interpretation and education so that this information will be communicated to park visitors as appropriate.
- Provides division personnel for fire management assignments.
- Acts as team leader of the division in coordination with the FMO on the multidisciplinary team for the purpose of fire planning.

#### *Chief of Interpretation and Education*

- Provides interpretive services to inform the public of the park fire management program, fire prevention, specific fires, and of fire effects, etc.
- Provides fire prevention information to subordinates, who in turn provides this information to park visitors as appropriate.
- Provides input as it might relate to interpretation into the planning of management ignited prescribed fires.
- Provides division personnel for fire management assignments.
- Acts as member of multidisciplinary team for fire planning.

#### *Chief of Visitor Protection and Emergency Services*

- Provides division personnel for fire management assignments.
- Acts as member of multidisciplinary team for fire planning.
- May act as FMO/duty officer in the FMOs absence if qualified.

#### *Chief of Maintenance*

- Provides information on utilities and other facilities that may be susceptible to fire damage, damaged by the suppression effort, or overused as part of a suppression effort.
- Provides fire prevention information to subordinates, and provides that this information will be communicated to park visitors as appropriate.
- Provides vehicles, equipment and other logistical support required for fire operations.
- Provides division personnel for fire management assignments.
- Provides telecommunications and IT support personnel for incident management teams assigned to park fires.

#### *Park Biologist*

- Acts as member of multidisciplinary team for fire planning.
- Monitors long-term fire management effects and assists as needed in fire research activities.
- Monitors sensitive resources for potential impacts from fire and helps mitigate impacts.
- Acts as a resource advisor to incident management teams assigned to park fires.
- Makes recommendations as necessary for post-fire rehabilitation of burn sites or of damage caused by suppression or prescribed fire preparation activities.

#### *Geographic Information System (GIS) Specialist*

- Manages spatial data on fire history, natural and cultural resources, and park infrastructure and facilities to support fire management planning, monitoring and fire related research, and incident management.
- Member of multidisciplinary team for fire planning.
- Delivers GIS products (maps, data and analyses) to assist park managers and specialists, the fire management officer and incident teams in fire management.
- Provides sensitive park data (caves, cultural resources, threatened and endangered species), with use restrictions, only as needed to support fire management operations and decision-making for the protection of park resources.
- Acts as a resource advisor and GIS specialist to support incident management teams and GIS technical specialists assigned to park fires.

#### *Fire Management Officer*

- Supervises and/or coordinates all wildfire prevention, pre-suppression, suppression, and fire related aviation operations, acts as duty officer whenever present. Serves as or appoints prescribed burn boss/IC for park fires.
- Acts as FUMA, if qualified. Prepares or reviews all park prescribed burn plans, wildland fire assessments, WFSAs, WFIPs, and individual fire reports.
- Provides liaison with fire management staffs of regional and neighboring land management agencies. The FMO serves as the direct contact for the NPS Regional FMO.
- Supervises and/or coordinates park fire management dispatching.
- Manages all operational and emergency fire management program accounts. Ensures that funds are both allocated and requested to maintain the fire management program described in this plan.
- Maintains inventories of all park fire-related resources and ensures that all firefighters are fully qualified for duties assigned.
- Maintains records of all fires and ensures transmission of these records to the NPS fire management computer system.
- Provides training opportunities to qualified personnel to maintain proper numbers of employees to carry out routine fire management operations.
- Maintains fire weather records collected in the park and ensures that daily fire weather data is entered into WIMS. Interprets NFDRS outputs, and advises the chief ranger of high, very high, or extreme fire danger.
- Acts as agency representative to incident management teams assigned to park fires.
- Drafts and reviews mutual aid/ mutual response agreements for the superintendent's signature.
- Ensures that post-fire reviews are completed on a timely basis for all suppression fires, prescribed fires, and WFUs.
- Reviews and updates this fire management plan and its appendices including park pre-attack plans on an annual basis to maintain a professional fire management program that is consistent with current technology and NPS policy.

#### *Fire Ecologist/Fire Effects Monitors*



- Oversees and performs all aspects of prescribed and wildland fire monitoring.
- Coordinates all wildland fire and prescribed fire related research with other park disciplines and academia.
- Collects and processes fuels data.

#### *Fire Program Management Assistant*

- Assists the FMO with fire weather data processing, fire reporting, fire qualifications data processing, fire equipment inventories, and fire management program budget management.
- Acts as IA dispatcher or dispatch recorder during periods of fire activity.
- Acts as prescribed fire monitor and/or fireline data collector, if qualified.
- Performs all fire-related clerical duties such as timekeeping/payroll, travel reporting, typing and filing.
- Acts as park aviation clerk as needed.

#### *Administrative Officer*

- Authorizes in-park allocation of funds for pre-suppression, suppression, or management-ignited prescribed fire activities.
- Provides administrative expertise and assistance in travel finance, emergency procurement and employment, and other administrative matters.
- Establishes pre-season contracts for support services such as fuel, food and lodging.
- Establishes fire management accounts upon the request of the FMO or his/her designee.
- Provides fire prevention information to subordinates, and provides that this information will be communicated to park visitors as appropriate.
- Provides division personnel for fire management assignments.

### **E. Interagency Coordination to Implement the FMP**

The NPS cooperates closely with cooperators and park neighbors in the suppression of wildland fires and in prescribed fire. The interagency community in the Lincoln Zone shares all firefighting resources.

The park will coordinate all suppression, wildland fire use, and prescribed fire activities with interagency cooperators. The park has cooperative agreements with other agencies and will continue to work on an Interagency Fire Management Plan to either supplement or replace this one.

### **F. Key Interagency Contacts by Function**

- Fire Management Officer – Guadalupe Ranger District, Lincoln National Forest, USFS and Carlsbad Field Office, BLM
- Fire Management Officer – Roswell Field Office, BLM
- Logistics Coordinator – Pecos Valley Dispatch, Roswell Field Office, BLM
- Fire Staff Officer – Lincoln National Forest, Forest Supervisor's Office, BLM
- District Forester – Capitan District, New Mexico State Forestry
- Fire Chief – Whites City Volunteer Fire Department

## G. Wildland Fire Agreements

Appendix J contains the following cooperative agreements:

- Joint Powers Operating Plan for Lincoln Zone
- Pecos Valley Dispatch Agreement for Reciprocal Services
- Fair Share Agreement for Exclusive Use Helicopter in Lincoln Zone
- Cooperative Agreement with White City Volunteer Fire Department
- Interagency Agreement for Mutual Assistance in Prescribed Fire in the Guadalupe Mountains
- Interagency Agreement for Staffing of the Carlsbad Interagency Handcrew
- Interagency Agreement for an Interagency Fire Management Plan for the Guadalupe Mountains Ecosystem
- Memorandum of Understanding for Smoke Monitoring with the State of New Mexico

## VI. Monitoring and Evaluation

All prescribed fires and unwanted fires will be monitored as described in the *National Fire Monitoring Handbook* (2003). Monitoring should minimally include documenting the fire's environment (weather, fuel, topography), fire behavior (rate of spread, flame length, etc.), and fire effects (scorch height, consumption, etc.). Furthermore, monitoring will be done to document how well the burn is within its prescription and to advise the burn boss (RXB1 or RXB2) of conditions that may cause the burn to exceed its prescription and/or when the burn is out of prescription. It is the responsibility of the burn boss to insure that monitoring is accomplished.

The park currently lacks the knowledge to accurately and completely state how native species and ecosystem processes can be sustained. Therefore, the plan follows a relatively conservative approach to prescribed fire in the ecosystem, relying on past conditions and historic patterns as a guide for fire management strategies. Past fire disturbance regimes provide a general premise that native species have functioned and are adapted to the range of habitat patterns resulting from historic disturbance events for a prolonged period. Long-term ecological fire research would describe the range of conditions established by fire disturbance and ecological succession.

Monitoring of indicator species is needed to track the changes in the park ecosystem following fire. The indicators must be 1) based on simple measurements, 2) quantifiable, 3) repeatable and 4) yield information on ecosystem condition.

Analysis will be conducted to determine the extent of detrimental impact that can result from fire suppression activities such as retardant and fire line construction.

## VII. Fire Research

### A. Fire History

The frequency of fires set by Native Americans or lightning prior to the late 1800s is not known for the vegetation communities in the Chihuahuan Desert. Ahlstrand (1981b) reported a significant decrease in fire frequency after Native Americans were excluded from former mescal gathering and roasting areas by Europeans in the mid 1800s. Intense grazing eliminated fuels that could support fires in many areas in the Southwest (Swetnam et al. 1999). For the period between 1496 and 1922, fire frequency of about every 5 to 10 years, with widespread fires every 17 years, was estimated from tree-ring fire-scar

data in higher elevation forests and woodlands of the Guadalupe Mountains (just southwest of Carlsbad Caverns in the same mountain range) (Ahlstrand 1981b).

Over the past 150 years, heavy livestock grazing, climate change, and fire suppression have contributed to the increase of shrubs and decrease of grasses. Although fire is a natural disturbance in lower elevation Chihuahuan Desert ecosystems, fire frequency in grasslands and shrublands is difficult to determine due to lack of direct evidence. The literature suggests about 5 to 15 years as a fire-return interval that maintains grassiness in the face of invading shrubs in the Chihuahuan Desert (Kittams 1972, Ahlstrand 1982). Given the southwest-to-northeast wind-driven pattern of fires in the Guadalupe high country reached Carlsbad Caverns. Long-term fire effects studies in the region have yet to be carried out (Gebow and Halvorson 2002). The park has 10-years of data from its fire effects monitoring program that are highly variable, but the fire ecologist plans to reanalyze the data set in the near future.

In the 1980s, park managers worked to exclude trespass livestock migrating into the park from adjacent private and federal lands by fencing the perimeter of the park. The sudden cessation of heavy grazing, coupled with abnormally wet years, produced a bumper crop of grass and other herbaceous vegetation intermingled with the shrub and succulent vegetation. The resulting fuel conditions readily sustain ignitions not rained out or suppressed, as shown by several recent fires in and around the park, such as the 33,135-acre Big Fire of 1990 (11,040 acres on the park, 22,095 acres on neighboring Lincoln National Forest and BLM lands). Lightning fires accounted for 65.2 percent of the total number of ignitions for the 60-year period. Until the mid-1960s, though, lightning fires ran a close second to human actions, particularly smoking, as the main cause of fires in the park. Prescribed burning first shows up in the park's fire record in 1979.

## **B. Fire Ecology**

Fires at Carlsbad Caverns National Park over the past 20 years initially resulted in an increase in grasses and a reduction in shrubs, cacti, and agaves (Kittams 1972, Ahlstrand 1982). However, most woody species are not killed by fire and respond to burning by producing vegetative sprouts at the protected plant base. Perennial herbs often persist after fires and many annual seeds germinate after burning. Annual and perennial grass response after fire depends on the season burned. Studies show that with normal precipitation, blue grama is not harmed by prescribed burning but may decrease for two to three years under drought conditions (Wright 1978). Another study examining the effects of fire on the less common black grama has shown that fire can be detrimental (Cornelius 1988). Non-native grass species, such as Lehmann lovegrass, recover from fire more quickly and may replace native grasses. Summer burns can kill perennial grasses, especially if followed by a post-burn drought (Debra Peters, Jornada LTER Site, pers. comm.).

## **C. History of Fire Research at Carlsbad Caverns National Park**

Most of the fire research conducted at Carlsbad Caverns National Park was done by Walter Kittams in the late 1960s and early 1970s. His work focused primarily on the Desert Mountain grassland and shrublands.

Kittam's work at the park was generally short-term (three years) post-fire observational studies. Findings centered primarily on vegetation recovery following wild fires. Recovery of grasses varied by landscape position over the three-year period of the study. On steep upland south facing slopes, where shallow soils typically occur, grass cover appeared to be thinned by fire. On flatter surfaces where deeper soils are found, grasses recovered within three years following the fire. Most shrubs that where

lightly to moderately scorched during low intensity fires generally survived. When severely burned, mortality is induced in agaves (lechuguilla and Parry), smooth sotol, desert ceanothus, and sacahuista. The remaining shrubs either resprout from basal buds or reestablish new plants from fleshy roots such as Datil yucca.

Lechuguilla is a primary component in the shrub-grass fuel matrix of this community and poses a significant hazard to those traversing the landscape. Its current dominance is thought to be a consequence of overgrazing. Because of lechuguilla's vulnerability to fire, the recurrence of fire may play a significant role in determining its dominance on the landscape. Further research will be needed to determine if this is the case. Most of the smaller stature shrub species regain their pre-fire size within three to five years following a fire; however, larger statured shrubs such as pinchotii juniper may take much longer—15 to 20 years. Because the data that Kittam's examined on fire effects was observational, with no pretreatment data available for comparison, changes in species composition could only be made by comparing burned areas to adjacent unburned areas and assuming that species composition was equivalent prior to the fire. This is problematic due the difficulty of identifying burned herbaceous plants to species or genus as whether they were alive or dead prior to being burned. Consequently only limited conclusions can be drawn from this study as to changes in species composition following a wildfire.

Gebow and Halverson (2001), in a report for Carlsbad Caverns National Park, surveyed all of the research related to fire in the region, including Guadalupe Mountains National Park. This report annotates the findings of all of research published or found in reports on file at the park and it also does so by plant species.

#### **D. Fire Research Needs at Carlsbad Caverns National Park**

One of the current management questions with respect to fire is the desired conditions of the desert mountain grassland and shrublands at Carlsbad Caverns National Park. A significant portion of the park was grazed until relatively recently. Grazing served as passive fire suppression that altered the natural fire regime and presumably vegetation structure. It is reasonable to assume that prior to livestock grazing many fires that burned within the park started beyond the park's boundary. Did fires starting in the lowlands stop at the base of the Guadalupe Escarpment or was there enough fuel on the slopes to allow fire to ascend the escarpment and continue spreading across the landscape?

Today, while there may be an adequate amount of fine fuel within the park to sustain large fires, these fires will need to originate largely within the park. Grazing continues in many places beyond the park boundary, thus minimizing the potential for fire starts on these lands to spread onto the park, in effect extending the fire-free period between fires than what would otherwise occur naturally. In order to compensate for this grazing effect on fire return intervals, prescribed fire will need to be assessed in maintaining the current vegetation within the park. However there are several research questions that arise. First and foremost is that of desired vegetation condition(s):

- *Current vegetation trends:* One important aspect of managing the park's vegetation is knowing the trajectory of plant communities into the future. Is composition and structure static? Is shrub/tree density increasing and grass cover decreasing or is the reverse true? While a vegetation map has recently been completed and is currently slated for validation, it is only a snapshot of the vegetation at a point in time. Currently no monitoring data is being collected to determine vegetation dynamics over time. While there will be monitoring of vegetation with respect to fire effects associated with fuels treatments, this data will need to be supplemented with trend data to assess fire effects in the context of the surrounding vegetation. Revisiting the

plots that were established to develop the map would be an important first step in determining vegetation structure.

- *Desired Condition-Vegetation Structure and Composition:* During the ranching period, vegetation change likely occurred, most plausibly due to an increase in shrub density and cover, principally Pinchotii juniper and a corresponding reduction in grass cover. Research is needed to determine, to the extent possible, what extent vegetation change did occur, and what the primary cause was. This will help management define desired conditions and what role fire may play on the landscape.
- *Restoration:* While natural fire and possibly prescribed fire may effectively serve to maintain current tree and shrub densities by reducing or eliminating seedlings, it will have limited effect on reducing the density of established shrubs and trees. Fire merely top-kills most tree and shrub species that occur at Carlsbad Caverns National Park (Kittams 1973). Burned trees return to pre-burn stature from basal buds following fire within 5 to 20 years, depending on the species and its size prior to burning and precipitation patterns. If the goal of vegetation management is to shift vegetation structure and composition to pre-grazing conditions, where fire return intervals were conceivably shorter, shrub density lower and grass cover greater, treatments other than prescribed fire may be required. Chemical or mechanical treatments may be needed to kill trees and shrubs that established during the grazing era followed possibly by natural and prescribed fire to maintain the restored vegetation. Prior to general landscape applications an assessment of the efficacy and feasibility of prescribed fire and alternative mechanical and chemical treatments is needed. Mechanical and chemical treatments will need to be conducted at a small-scale prior to general application. The effects of prescribed fire can be addressed largely through fire effects monitoring of currently planned projects; however, some controlled experiments may be required.
- *Fire Return Intervals:* One of the problems of using recurrent prescribed fire to replace or supplement an altered natural regime is knowing the historical frequency of fire occurrence before livestock grazing became widespread. Unlike forests, there is no fire record left from which historical fire return intervals can be determined. However, an analysis of fire history and annual precipitation at both Carlsbad Caverns and Big Bend National Parks suggest that the cumulative area burned from a year up to a five-year period is related to the amount of precipitation received in preceding years, especially over a three- to five-year period that can vary over time. Generally during dry periods the potential to burn large areas is small. As precipitation increases this potential increases. This relationship between cumulative area burned and precipitation pattern is probably related to fire frequency. For both Carlsbad Caverns and Big Bend National Parks there appears to be a precipitation threshold that when reached there is a high probability of having large areas burn and a low probability of only a small area burning. The inverse is true of dry or drought years. A major limitation of this analysis is that it spans a period where grazing had already significantly altered the vegetation and presumably the fire regime for an extended period and that the vegetation over the period of the analysis was in a state of recovery. In an intact system, it is possible that vegetation response to precipitation patterns may be different. This will warrant research into the dynamics of precipitation and fire regime.
- *Sensitive Species:* The Federally listed Snead's pincushion cactus is the species that will most likely be affected by fire at Carlsbad Caverns National Park. The natural history of the plant, with respect to ecological disturbances such as fire, is needed. While it generally occurs in areas that burn infrequently or not at all, and at low intensity, does the population(s), during

extended fire-free periods, expand into areas where fuels are more abundant and fires more intense? During extended fire-free periods does increased fuel loading in the plant's core habitat place the population(s) at risk? Are these species resilient to a broad range of fire intensity? These are important questions that must be answered if the park is to meet its federally mandated obligation to protect these species.

## VIII. PUBLIC SAFETY

The first and primary goal in this plan is to provide for the protection and safety of people and property. This extends to the personal safety of the public, park visitors, firefighters and employees.

### A. Public Safety Issues and Concerns

The vast majority of the park's visitation is centered in and around the developed area surrounding Carlsbad Cavern. The developed area also includes an administrative office complex, maintenance facilities and a residential area. There is a single, seven mile-long, two-lane paved road providing access to this area from Whites City and US 62/180.

The park hosts more than 500,000 visitors each year with the majority arriving during the summer and during the peak of the fire season. With the primary visitor destination underground, an evacuation may be prolonged due to the time involved in "sweeping" the cave trails and transporting visitors to the surface.

Backcountry use in the park likewise peaks with the summer season. However, there are not usually more than one or two backcountry permits out at any given time from one or two primary trailheads.

The Rattlesnake Springs unit of the park has a single residence and is adjacent to Washington Ranch that houses a developmentally disabled residential population and some recreational facilities, including bunkhouses for 60 guests.

Wildland areas along park boundaries include ranches, housing, livestock and agricultural resources.

### B. Public Safety Protection

**1. Prevention:** The cornerstone of the public safety protection effort is prevention. The park will seek to provide a variety of prevention efforts to include the following groups and topics:

#### *Targeted Groups*

- Park employees
- Park visitors
- Park residents
- Backcountry visitors
- Community groups/civic clubs/residents
- Students/youth

#### *Primary Topics*

- Workplace/wildland interface fire prevention
- Residence/wildland interface fire prevention
- Wildland fire prevention
- Fire reporting, response, management

*Fire Season Efforts*

- Backcountry – prevention message when permits are issued, trailhead signing
- Fire season specific information, postings
- Interpretive programs
- Pre-event prevention planning and activities with cooperators
- High/extreme fire danger public use restrictions
- Advisories at point of sale for tickets and in the visitor center
- High fire danger signing

*Methods of Delivery*

- Non-personal (e.g., signs, brochures, posters, displays)
- Personal contact
- Interpretive programs
- Group presentations

**2. Fire Incident Public Safety Protection**

Fire event public safety protection considerations for the IC include the following:

- Management and control of public access to minimize risk of harm and interference with safe and efficient operations of fire management personnel.
- Media advisories and pre-arrival advisories for visitors
- Signing—smoke warnings, prescribed fire advisory, emergency event advisory
- Area closures
- Ranger escort on roads/trails through fire areas in cases where safe passage may continue and when there may be reduced visibility or other minor hazards
- Area evacuation
- Public exclusion from fire perimeter
- Advisory to adjacent landowners
- Escape routes and safety zones identified and communicated to the public
- Staging of suppression resources in developed areas
- Broad-scale backcountry closure
- Obtain the assistance of other public safety agents to assist (e.g., Eddy County Sheriff's Office, Eddy County Emergency Management)
- Roadblocks/advisory control points to advise visitors and residents of hazardous conditions, potential evacuations, etc.
- Daily briefing to visitor center staff on current fire conditions/situation
- Fire perimeter/area of operations security patrol
- Safety briefing/personal protective equipment/escort/ for VIPs, media, other official visitors

## IX. Public Information and Education

Educating and informing the public on the value of fire as a natural process is important to increasing public understanding and support for the park's fire management program. The public affairs specialist, in coordination with the fire management officer and other resource specialists, has the primary responsibility for providing this information. As fire danger and/or fire activity in the park increases, the fire management officer will provide the public affairs specialist and other key staff with up-to-date information on the current and expected fire situation in the park and surrounding areas.

Park staff will use the most appropriate and effective means to get information to the public regarding the fire management program. This may include handouts, personal contacts, and media releases. The park's fire information program will include:

### A. Year-Round Activities

- Information on the park's fire management program will be incorporated, as appropriate, into park brochures, newspapers and other handouts.
- Park interpretive and educational programs will be designed to enhance public and staff awareness of the fire management program.
- Fire management-related information will be shared with the local community and local, state and other federal agencies.

### B. Fire In-Progress Activities

- When fires are actively burning in the park, all visitor contacts will include a fire safety message as well as information on the fire situation.
- The media will be informed through news releases and/or informational briefings from the park's public affairs specialist, or if assigned, a fire information officer.
- The most up-to-date fire situation information will be shared with the local community, as well as with all neighboring landowners—private, local, state and federal.

Prior to any prescribed fire within the park boundary, informational materials, including handouts and news releases, will be made available to visitors, the local community and the media that convey the park's goals and objectives for that specific management action. All fire related activity will be reported on Inside NPS (<http://data2itc.nps.gov/fire/admin/index/cfm>). The report should cover mechanical and 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.

## X. Protection of Sensitive Resources

Sensitive resources will be identified on maps for the resource advisors. In some prescribed fires pre-burn mitigation and/or black-lining around sensitive resources might help us avoid unwanted fire effects and meet our legal responsibilities for biological diversity, endangered species and cultural resource protection.

### A. Protection of Sensitive Resources

*Threatened and Endangered Species.* One endemic species of cactus, Lee pincushion, is listed as *threatened* on the USFWS List of Endangered and Threatened Wildlife and Plants. No prescribed burns will be conducted in areas that contain listed or proposed threatened or endangered species without prior consultation and approval of the USFWS.



*Cave Resources.* The effects of fire on deep caves and cave biota is largely unknown, although there are several documented instances of short-term negative impacts on cave biota. Every reasonable effort will be made to minimize the effects of both prescribed fires and unwanted fires on cave resources until these effects are more completely understood.

*Cultural Resources.* While fire itself will not harm park cultural resources such as ring middens or remnants of stone shelters, care must be taken during suppression efforts to prevent accidental damage through careless location of fire lines, use of heavy equipment, careless use of chemicals, pillaging by firefighters, etc. (Appendix Q)

Some level of mitigation or protection for rare plant communities, such as seep forest communities and spring wetlands or areas of high densities of threatened or endangered species. Historically, *natural* fires may have skipped over these areas. It would be desirable to have a low intensity fire in the madrone-walnut plant communities.

In its biological assessment for the three federally listed species, the park stated that the new fire management plan is *likely to adversely affect* the Mexican spotted owl (federally threatened), Lee pincushion cactus (federally threatened), and Sneed pincushion cactus (federally endangered). It also stated that the long-term effects of restoring natural fire to the system would benefit all species.

In the biological opinion, the USFWS *anticipates incidental take* of a few individuals as a result of implementation of the plan. In order to minimize the take, the biological opinion identifies several *reasonable and prudent measures* with detailed *terms and conditions* for their implementation.

Section 9 of the Endangered Species Act and federal regulation pursuant to Section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any such conduct. Harass is further defined as intentional or negligent actions that creates the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding and sheltering. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Incidental take is defined as taking that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under Sections 7(b)(4) and 7(o)(2), taking that is incidental to, and not intended as part of the agency action is not considered a prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement. The measures described below for the Mexican spotted owl are non-discretionary and must be implemented by the NPS so that they become binding conditions of any grant or permit issued, as appropriate, in order for the exemption in Section 7(o)(2) to apply.

In order to be exempt from the prohibitions of Section 9 of the Act, the NPS and their employees, contractors, or subcontractors must comply with terms and conditions that implement the reasonable and prudent measures described below. These terms and conditions are non-discretionary.

### **Reasonable and Prudent Measures for the Mexican Spotted Owl**

The USFWS believes the following reasonable and prudent measures are necessary and appropriate to minimize take:

- 1) The NPS shall conduct all WFU or prescribed fire activities in a manner that will minimize adverse affects to the Mexican spotted owl and minimize modification and loss of Mexican spotted owl habitat.

- 2) The NPS shall document all actions, report incidental take, and monitor the effects of the proposed action.
- 3) If fire suppression is initiated, suppression activities shall be carried out in a manner that minimizes adverse affects to the Mexican spotted owl and minimizes modification and loss of Mexican spotted owl habitat, unless such actions would threaten life or property. This represents the indirect effects of WFU or prescribed fire burning out of prescription or the direct effects of suppressing a naturally ignited wildfire.

### **Terms and Conditions for the Mexican Spotted Owl**

In order to be exempt from the prohibitions of Section 9 of the Act, the NPS and their employees, contractors, or subcontractors must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

The following terms and conditions are established to implement Reasonable and Prudent Measure 1:

- 1.1 Where physically practicable and in a manner that does not compromise human safety in any way, delineate 100-acre core area or the area centered around the known or presumed nest location for each PAC (protected activity center) when the park has identified PACs. Identify and use these areas to reduce adverse effects to the Mexican spotted owl from prescribed fires by managing or retaining key Mexican spotted owl habitat components, without impeding the objectives of the fire management plan.
- 1.2 If it becomes apparent that a fire might enter Mexican spotted owl habitat and affect a PAC, to the extent practicable, attempt to determine the location and breeding status of Mexican spotted owl in that PAC.
- 1.3 All field personnel who implement any portion of the proposed action shall be informed of regulations and protective conservation measures as described in this biological opinion, the environmental assessment, and the biological assessment for the Mexican spotted owl.
- 1.4 During any emergency situation, the primary objective for the Mexican spotted owl is to provide recommendations for minimizing adverse effects without impeding response efforts. During emergency events, protecting human life and property should come first every time. Consequently, no constraints for protection of Mexican spotted owl habitat are necessary if they place human lives or structures in danger.
- 1.5 The NPS shall ensure that all pertinent information from the reasonable and prudent measures of this biological opinion is included in the final burn plans for all fire management actions.
- 1.6 The NPS shall ensure that no more than 700 acres of unsurveyed, potentially occupied Mexican spotted owl nest/roost habitat is affected by WFU each year.

The following terms and conditions are established to implement Reasonable and Prudent Measure 2:

- 2.1 The NPS shall document all actions, report incidental take, and monitor the effects of the proposed action on the Mexican spotted owl and its habitat. Those findings shall be reported to us by December 31 of each year. The report shall document the areas and acreage burned, the type of fire (prescribed fire, WFU, wildfire), the name(s) of any PAC(s) subjected to fire, the extent of any suppression actions, the implementation and effectiveness of the terms and conditions of this biological opinion, information about Mexican spotted owl monitored or encountered (including Mexican spotted owl surveys that were conducted), any rehabilitation completed, quantification of any incidental take as defined in this biological opinion, and any

recommendations for actions in the upcoming year(s). Maps shall also be provided that include each fire event and thinning activities that occurred. This action will ensure the environmental baseline for the Mexican spotted owl is reviewed annually to rectify anticipated effects with those that occurred.

- 2.2 The NPS will ensure that sufficient monitoring of the effects of fire on key habitat components of Mexican spotted owl habitat will be conducted after each fire event. Such monitoring shall be consistent with NPS monitoring requirements and protocols.
- 2.3 To the extent practicable, the NPS will conduct fire-severity monitoring in Mexican spotted owl habitat after each fire event. If the observed proportion of the event in high to moderate-to-high severity categories is greater than that expected in the incidental take statement of this biological opinion, then prescriptions will be adjusted to ensure that fire severity of future events are reduced.

The following terms and conditions are established to implement Reasonable and Prudent Measure 3:

- 3.1 The NPS shall promptly notify the USFWS New Mexico Ecological Services Field Office of any declared wildfire actions in Mexican spotted owl habitat.
- 3.2 A resource advisor will be available for all activities that affect Mexican spotted owl habitat associated with the fire management. Resource advisors shall be knowledgeable of the Mexican spotted owl and its habitat. The resource advisor shall possess maps of all PACs and/or modeled Mexican spotted owl habitat in the project area. The resource advisors shall coordinate Mexican spotted owl concerns and serve as an advisor to the IC/IMT. He/she shall also serve as field contact representative responsible for coordination with the USFWS New Mexico Ecological Services Field Office and shall monitor fire-related activities to ensure protective measures endorsed by the IC/IMT are implemented.
- 3.3 All fire suppression actions in Mexican spotted owl habitat will occur, to the maximum extent possible, using minimum impact suppression tactics. This will include actions consistent with the recovery plan such as not removing trees over nine inches dbh (diameter at breast height) in PACs unless it is deemed necessary for tactical and/or safety reasons or to prevent the fire from affecting additional Mexican spotted owl habitat.
- 3.4 Fire operations will proceed without low level helicopter flight over occupied PACs during the breeding season (March 1 through August 31), except in emergency life-threatening situations, when it is tactically necessary, or when human structures are in danger.
- 3.5 Mexican spotted owl habitat disturbed during fire suppression activities, such as fire lines, crew camps, and staging areas, shall be rehabilitated to discourage their use by vehicles or hikers.
- 3.6 The park shall use identified Mexican spotted owl habitat to prioritize areas for protection, and locate access points for suppression, WFU, and prescribed burning activities. This information will be communicated in advance (when feasible) to fire management personnel. For example, fire camps, staging areas, and any other areas of disturbance created for fire suppression actions shall be located outside of Mexican spotted owl habitat, whenever possible.

Park sensitive species lists can be found in Appendix S.

Park Cultural Resource Component can be found in Appendix Q.

References cited regarding sensitive resources can be found in Appendix Y.

## **XI. FIRE CRITIQUES AND ANNUAL PLAN REVIEW**

### **A. Fire Critiques**

The FMO will conduct an annual critique of all Class A, B and C wildland fires. Sample questions for these reviews can be found in RM-18. This review will be documented in writing.

All Class D and larger wildland fires will be reviewed separately using these same formats.

All prescribed fires and WFUs will be reviewed separately using the formats suggested in RM-18. It will be the responsibility of the FMO to schedule these reviews and complete the written reports.

The superintendent and park staff will cooperate with any requests for regional or national level reviews of park prescribed fires or wildland fires.

### **B. Procedure for Revising this Fire Management Plan**

The superintendent of Carlsbad Caverns National Park approves this plan. Significant changes to the body of this plan must be approved by the superintendent and concurred by the FMO. Subsequent amendments, modifications, and the required annual reviews are also under the signature authority of the superintendent.

The only exceptions to this procedure will include:

- Grammatical corrections
- Minor procedural changes
- Deletions, corrections, and additions to the appendices.

A memorandum detailing the corrections, changes, or updates will be approved by the superintendent and appended to this plan as Appendix Z.

Copies of this memorandum will be promptly forwarded to the Branch of Fire and Aviation Management at the Intermountain Regional Office, the superintendent, and the FMO. Any revised pages to be appended to the plan are to be dated in the lower right-hand corner of the page.

Changes requiring the approval and concurrence of the superintendent will be submitted with a new cover sheet for signature and dates that will replace the original cover sheet upon receipt by the FMO.

## **XII. CONSULTATION AND COORDINATION**

Carlsbad Caverns National Park has memoranda of understanding and other agreements with all federal, state, and local agencies both along its boundaries and in the area as is displayed in Appendix J. These memoranda provide for information dissemination and other cooperation among signator agencies.

These agencies have created, through a charter sanctioned by the Southwest Area Fire Management Board, a board known as the Lincoln Zone Coordination Board. This board governs the management of the Lincoln Zone Coordination Center (LNZ) located at Alamogordo, New Mexico. All information dissemination, fire restrictions, and interagency resource movements are coordinated within the zone by LNZ.

The primary authors of this plan were:

- Jim McMahill, Guadalupe Mountains / Carlsbad Caverns National Parks FMO
- Tim Stubbs, Carlsbad Caverns National Park FMO (retired)

Renee West, Biology Branch Chief, Carlsbad Caverns National Park

Richard Gatewood, Fire Ecologist, Carlsbad Caverns National Park