

Capulin Volcano

National Monument
National Park Service

2005 Fire Management Plan



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TABLE OF CONTENTS

I. INTRODUCTION

- A. Reasons for Developing this Plan
- B. Collaborative Process in Developing Plan and Collaborative Opportunities
- C. Resource Management and Fire Protection Goals
- D. Compliance
- E. Authorities

II. RELATIONSHIP TO LAND MANAGEMENT AND FIRE POLICY

- A. National Park Service Management Policies Concerning Fire Management
- B. Enabling Legislation and Purpose of Site
- C. General Management Plan Objectives
- D. Resource Management Plan and Fire Management Plan Objectives
- E. Role of the Fire Management Plan

III. DESCRIPTION OF PARK

- A. Description of Monument Area
- B. Monument Values
- C. Land Classification and Monument Resources
- D. Adjacent Landowners, Agencies, and Land Uses

IV. WILDLAND FIRE MANAGEMENT STRATEGIES

- A. General Management Considerations
- B. Wildland Fire Management Goals
- C. Wildland Fire Management Options
- D. Description of Wildland Fire Management Strategies by Fire Management Unit

V. WILDLAND FIRE MANAGEMENT PROGRAM COMPONENTS

- A. General Implementation Procedures
- B. Wildland Fire Suppression
- C. Wildland Fire Use
- D. Prescribed Fire
- E. Non-Fire Applications
- F. Emergency Rehabilitation and Restoration

VI. ORGANIZATIONAL AND BUDGETARY PARAMETERS

- A. Organizational Structure of Site's Fire Management Program
- B. FIREPRO Funding
- C. Fire Management Organization in Relation to Park Organization
- D. Fire Plan Assessment and Approval by Park Superintendent
- E. Interagency Coordination

- F. Key Interagency Contacts
- G. Fire-Related Agreements

VII. MONITORING AND EVALUATION

- A. Monitoring Requirements
- B. Fire Monitoring
- C. Fire Monitoring Plan

VIII. FIRE RESEARCH

- A. Completed Research
- B. Research Needed

IX. PUBLIC SAFETY

- A. Public Safety Issues
- B. Procedures for Mitigating Safety Issues

X. PUBLIC INFORMATION AND EDUCATION

- A. Public Fire Information Capabilities and Needs
- B. Step-Up Plan Information Actions

XI. PROTECTION OF SENSITIVE RESOURCES

- A. Archeological, Cultural and Historic Sites
- B. Natural Resources
- C. Infrastructure and Developments

XII. FIRE CRITIQUES AND ANNUAL PLAN REVIEW

- A. Critiques
- B. Plan Reviews

XIII. CONSULTATION AND COORDINATION

- A. Agencies Consulted
- B. Persons Consulted:

XIV. APPENDICES

- A. References Cited
- B. Definitions
- C. Species List
- D. NEPA and NHPA Compliance
- E. Annual Revisions
 - 1. Step-up plan
 - 2. Fire phone list
 - 3. Fire cache inventory
 - 4. Prescribed fire prescription
 - 5. Cooperative Agreements
 - F. Fire Monitoring Plan
 - G. Pre-attack Plan
 - H. Long-term Prescribed Fire and Hazard Fuel Reduction Plan
 - I. Fire Prevention Plan
 - J. Rental Equipment Agreements
 - K. Resource Contracts
 - L. Emergency Rehabilitation Plan

EXECUTIVE SUMMARY

National Park Service and the Department of Interior fire management polices support resource management goals. An overriding resource goal is the preservation and restoration of natural ecosystems, while providing for firefighter and public safety, and protecting natural and cultural resources and human developments from unwanted wildland fire.

Resource management goals and objectives originate in approved agency resource and general management plans. The Fire Management Plan (FMP) for Capulin Volcano National Monument takes direction from the draft General Management Plan (GMP)/Environmental Impact Statement (2002). The GMP contains broad statements of desired condition related to the role of fire:

- Natural systems experiencing impacts from human disturbance, such as accelerated erosion, exotic species invasions, and alteration of hydrologic patterns are restored.
- Short grass prairie and the pinyon-juniper mixed woodlands are managed to promote natural processes and to contain the spread of exotic species.
- Wildland fire would be managed according to the fire management plan.

The FMP combines scientific knowledge, including regional and local studies, with guidance from the Department of Interior (DOI), the National Park Service (NPS), the Interagency Wildland and Prescribed Fire Management Policy (1995), and the National Fire Plan (2002) to accomplish resource and fire management goals and objectives. This plan is written to be clearly understood and implemented by Capulin Volcano National Monument managers, resource, and fire management staff; and is primarily operational in nature. Program operations included in this plan are preparedness, prevention, suppression and fuels management.

Compliance with the National Environmental Policy Act and Section 106 of the National Historic Preservation Act has been satisfied through development of an Environmental Assessment/Assessment of Effect, which is appended to this plan. Compliance ensures prudent assessment and balance between federal action and any potential effects of that action which leads to consensus between fire managers, agency resource specialists, and the public regarding the Capulin Volcano National Monument fire management program. Any constraints or limitations imposed on the fire management program are also included.

I. INTRODUCTION

A. Reasons for Developing this Plan

This plan outlines the actions that will be taken to meet fire management goals for Capulin Volcano National Monument (CAVO). This plan meets the requirement of National Park Service (NPS) Director's Order 18 that directs all park units with burnable vegetation to have a wildland fire management plan approved by the Superintendent.

B. Collaborative Process in Developing Plan and Collaborative Opportunities

An interdisciplinary team met in November 2002 to outline a work plan for the development of the Fire Management Plan (FMP). Preliminary scoping and public meetings took place with neighboring land owners, the public, and local land management agencies and will be address in the FMP. Agreements with State and private landowners will continue to be utilized in the suppression of wildland fires and implementing prescribed burns and mechanical fuel treatments.

C. Resource Management and Fire Protection Goals

The Fire Management Plan (FMP) will help achieve resource management and fire protection goals as defined in the draft General Management Plan and the Resources Management Plan.

In order to meet the management goals, the park will suppress all wildland fires that are not started by management, and will ignite prescribed fires at approved times and places in order to allow fire to be a part of the natural processes that occur in the park.

The Resources Management Plan (RMP) for the park specifically addresses the issue of fire management. The FMP implements fire-related management actions to accomplish goals and objectives specifically identified in the RMP. The FMP is an appendix to the RMP for Capulin Volcano National Monument.

D. Compliance

The attached Environmental Assessment (EA) serves as the National Environmental Protection Act documentation for this plan. The EA is located in Appendix D.

Fire management actions in the park will be implemented in accordance with the regulations and directions governing the protection of historic and cultural properties as outlined in the Department of the Interior Departmental Manual, part 519, and Title 36 of the Code of Federal Regulations; National Historical Preservation Act, section 106.

E. Authorities

The authorities for implementing this plan are contained in the National Park Service Organic Act of 1916; section 910, 1.1 of the Departmental Manual; National Park Service Management Policies (1988); Director's Order 18 and Reference Manual 18. The Organic Act states that the purpose of the National Park Service is to "conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

National Park Service Policies 2001, Director's Order 18 (November 1998) and Reference Manual 18 (February 1999) are the guiding documents for wildland fire management plan implementation. The Park's fire management objectives conform to the referenced documents.

Reference Manual 18 adds that the FMP will reflect NPS policies, and "the specific characteristics, legislative obligations, environmental, and social considerations" for each particular area.

II. RELATIONSHIP TO LAND MANAGEMENT PLANNING AND FIRE POLICY

A. National Park Service Management Policies Concerning Fire Management

It is NPS policy (DO #18) to allow natural processes to occur while meeting management objectives. Fire once played an important role in the local ecosystems of Capulin Volcano. Far from being a negative and destructive force, naturally occurring fires have helped to shape the landscape over time. In many cases, the landscape today shows the legacy of past fires. 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 fire from an ecosystem deprives that system of a powerful and dynamic natural force. The ultimate goal of fire management in the NPS is to restore fire to park ecosystems where possible through prescribed fires. Human-caused wildland fires will still be appropriately managed, which at CAVO means suppression.

Vegetation on Capulin Volcano has changed over the last 100 years. Pinyon-juniper forests replaced short grass prairie species over much of the steep slopes of the Monument and on surrounding parklands. Vegetative cover is essential for stabilization of ash and cinder covered slopes. Without periodic fires, shrub species have increased and native grass species are reduced.

Short grass prairie habitat, estimated to be over 200 acres, is being lost due to invasion of shrubs particularly along the lower fringes of the volcano. Prescribed fire that simulates

the natural fire regime of the area will: 1. reduce fuel buildup, therefore reducing the chances of catastrophic fire within the Monument; and 2. restore and maintain the diversity of the Monument's habitats.

B. Enabling Legislation and Purpose of Site

President Woodrow Wilson set Capulin Mountain aside as a National Monument by Proclamation No. 1340 of August 9, 1916 (39 Stat. 1792) to preserve "...a striking example of recent extinct volcanoes..." which "...is of great scientific and especially geologic interest..." Public Law 87-635, September 5, 1962, amended the proclamation to "...preserve the scenic and scientific integrity of the Capulin Mountain National Monument..." Public Law 100-225 (101 STAT. 1547) December 31, 1987 changed the name of Capulin Mountain National Monument to Capulin Volcano National Monument to emphasize the geologic significance of the area. The NPS Mission Statement from the draft General Management Plan at Capulin Volcano NM (NPS 2002) states:

Dedicated to protecting a classic cinder cone and its scientific integrity, Capulin Volcano National Monument ensures the opportunity to study, enjoy, and understand the powerful forces and dynamic processes that shape our world. The National Park Service will work in partnership to promote appreciation and protection of a shared land heritage in northeast New Mexico.

C. General Management Plan Objectives

The draft GMP lists the desired conditions of fire management as designed programs that meet resource management objectives for various areas of the monument and to ensure that the safety of firefighters and the public are not compromised.

D. Resource Management Plan and Fire Management Plan Objectives

1. Maintain the integrity and setting of Capulin Volcano National Monument's cinder cone, as well as the natural qualities of the other volcanic and natural features, to prevent any further deterioration due to adverse manmade processes.
2. Secure, through research or other means, accurate and complete information to facilitate long-term perpetuation of the Monument's volcanic features, ecological communities, and provide the basis for sound management decisions and interpretation.
3. Develop and maintain cooperation with state, other federal agencies, local communities and landowners, and interest groups to protect the Monument, promote local pride, and enhance Monument programs.

4. Restore conditions in the Monument to their state before livestock grazing and the total fire suppression policy was initiated. Allow natural processes to drive Monument ecosystems to promote the natural diversity of habitats and species.

Other issues identified in the Resource Management Plan that pertain to Fire Management:

1. Mimic a natural fire regime through the application of prescribed fire.
2. Develop a practical Geographic Information System and database management system for the resource management program of the Monument.
3. Continue monitoring vegetation successional changes using old and new vegetation maps as baselines (This includes fire effects monitoring).
4. Map and monitor the spread of root rot disease (*Armillaria* spp.) in the Monument's pinyon junipers (dead P.J. adds to fire fuel loading).

E. Role of the Fire Management Plan

The Fire Management Plan can best be used to meet Resource Management objectives by providing a detailed program of action to implement fire management policies. These policies are reflected in the fire management project statements in the RMP. This Fire Management Plan recognizes a need for a transition from suppression only to an implementation of prescribed fire and mechanical schedule in combination with suppression to meet resource management objects.

III. DESCRIPTION OF PARK

A. Description of Monument Area

Capulin Volcano is a symmetrical volcanic cinder cone rising steeply and conspicuously from the surrounding grassland plains to an elevation of 8,182 feet above sea level. Its irregular rim extends about one mile in circumference and its crater is about 415 feet deep.

The cinder cone is forested with pinyon-juniper, which has established itself over the last 400 years. This is unique for the cinder cones in the immediate area. The Monument also protects over 200 acres of high plains short grass prairie (Stubbendieck, 1986). See appendix C for a vegetative species list.

B. Monument Values

Capulin Volcano offers excellent opportunities for observing and understanding volcanic formations, viewing the large Raton-Clayton Volcanic Field surrounding the Monument (100 recognizable volcanic features); and for gaining insights into the over nine million years of geological history of northeastern New Mexico.

The vista from the top of Capulin Volcano provides a panoramic view that includes much of the volcanic field and the distant snow-capped Sangre de Cristo Mountains. From the highest point on the crater rim, visibility is up to 90 miles, and portions of four states (New Mexico, Texas, Oklahoma, and Colorado) can be seen.

Capulin Volcano was an important landmark for Native Americans, explorers, and pioneers. It was on a trade route connecting the Rio Grande Valley and the Great Plains. The route was used by the Pueblo Indians to access the Plains and by Plains Indians such as the Comanche and Jicarilla Apache to access the Pueblo trade fairs. Spanish and other explorers also used the route. Coronado passed near the Volcano in 1541. It was a landmark along the Cimarron cutoff of the Santa Fe Trail, the Granada-Ft. Union military road, and Goodnight-Loving cattle trail.

C. Land Classification and Monument Resources

The majority of Capulin Volcano National Monument's 793 acres are classified and managed as a natural area. There are no private in-holdings in the Monument. The lands within the natural area will remain unaltered, except for the approved Class II Area for management and administrative use.

The terrain of the Monument consists of the steep volcanic cinder cone and portions of the connecting basalt lava flows that emerged from its base. There are no principle streams, lakes or impoundments within the Monument boundaries except for three sewage lagoons.

Soils found at Capulin Volcano occur in two major series: Bandera and Fallsam. The grasslands west of the cinder cone overlay the Fallsam-Rock complex. The cinder cone and sections east of the cone consist of the Bandera association.

Fallsam cobbly silt loam is a deep, well-drained soil occurring on the sides of basalt squeeze-ups and ridges, occupying 1-9% slopes. Erosion hazard from wind and water is slight. Effective rooting depth of vegetation is 40 inches or more. The Plains-Mesa Grassland habitat type is associated with this soil series.

Bandera gravelly silt loam formed from eolian and colluvial material of volcanic origin. It occurs on 0 – 25% slopes. These soils are excessively drained and somewhat deep with

an effective rooting depth of 12 – 26 inches. The hazard of water erosion is moderate and impact from soil blowing is slightly hazardous. Over 80% of the vegetation for these soils should be grass with forbs and woody species present. Cinder land is the soil type of cinder cones and is also associated with the Bandera series. Cinder land is very similar to the Bandera soil, except that soil depth to cinders is 0 – 4 inches and occurs on 10 – 80% slopes. The Pinyon-Juniper Woodland habitat type is associated with this soil. The physical stability of geologic features, cinders, ash, and soil is sensitive to human caused disturbance and weather events. The severity and aerial extent of fire, combined with subsequent precipitation amounts, influence the extent that soils and geological features would be affected.

Wildlife is abundant in and around the Monument. Viewing opportunities are excellent for mule deer, wild turkey, fox, coyote and other small mammals, a variety of birds, and concentrations of ladybug beetles. Black bear, bobcat, and cougar are occasionally seen.

D. Adjacent Landowners, Agencies, and Land Uses

Land adjacent to the Monument's boundary is owned by private cattle ranchers and the State of New Mexico. All of the State land is leased to adjacent landowners for cattle grazing which is the principal land use in this area. Mineral rights, however, are retained by the state. Some volcanic cinder mining has occurred adjacent to the Monument and within the view shed of the Monument.

Within a 13 mile radius of the Monument is the town of Des Moines, which has a population of less than 200 people and the villages of Capulin and Folsom, which have less than 100 people. Local populations have declined over the past 20 years.

IV. WILDLAND FIRE MANAGEMENT STRATEGIES

A. General Management Considerations

Qualified firefighting personnel and firefighting equipment is minimal at Capulin Volcano. Because of limited resources, Capulin Volcano is part of an Interagency Agreement with the State of New Mexico/volunteer fire departments to serve as an additional resource in suppression of wildland fires within the Monument boundaries. Any wildland fire that occurs in the Monument will be reported to the Fire Management Officer at Lake Meredith NRA. Fire accounts will be established at Lake Meredith and Capulin Volcano will be held accountable for the accounts.

B. Wildland Fire Management Goals

An interdisciplinary planning team derived the fire management objectives from resource goals and objectives found in planning documents for Capulin Volcano National

Monument.

Goal 1: Ensure firefighter and public safety from all wildland fire within the park.

Objective: Ensure that wildland fire and prescribed fire operations cause no injuries to members of the public or to firefighters.

Strategy: All personnel involved in fire management operations will receive a safety briefing that describes known hazards and required mitigating actions. Briefings will address established firefighter safety practices, current fire conditions, and current and predicted fire weather and behavior.

Only qualified individuals may carry out fire management operations. For prescribed fires, each individual must meet National Wildfire Coordinating Group standards listed in the Wildland and Prescribed Fire Qualification Systems Guide 310-1, including the fitness test. Firefighting personnel responding to unplanned ignitions must meet the qualifications of their agencies. After initial stages, every effort will be made to utilize only personnel who meet the 310-1 standards.

Park neighbors, visitors, interagency partners, and local residents will be notified of all planned and unplanned fire management activities that could affect them.

The Superintendent may close portions of or the entire park to the public when fire activity poses a threat to human safety.

On every prescribed fire project there will be one person responsible for safety.

Goal 2: Prevent human-caused wildland fires.

Objective: Limit 95% of unwanted wildland fires to less than 10 acres in size.

Strategy: Suppress fires or portions of fires that threaten to damage public property.

Ensure that the New Mexico State Forestry and towns of Folsom, Capulin and Des Moines fire engines are in a state of readiness and available during fire season.

Ensure that the park staff members who are responsible for fire operations understand fire policy.

Establish and maintain effective working relationships with neighboring agencies

and landowners to better accomplish fire management objectives.

Goal 3: Suppress all unwanted wildland fires with minimum cost, using minimum impact management techniques to the greatest extent possible, while protecting values at risk.

Objective: Manage suppression actions to minimize suppression costs, and minimize cultural and natural resource impact.

Strategy: Ensure that wildland fire suppression operations employ minimum impact suppression tactics.

Ensure that fire operations personnel are briefed on park resources and potential damage from fire and suppression actions.

Goal 4: Establish or update cooperative agreements to maximize coordination with park cooperators.

Objective: Review and modify agreements with neighboring agencies annually.

Strategy: Coordinate with the following entities:

- Community of Folsom, New Mexico
- Community of Des Moines, New Mexico
- Community of Capulin, New Mexico
- New Mexico State Forestry
- US Forest Service, Clayton, NM

Goal 5: Use approved prescribed fire and surrogate (non-fire) treatments to restore and maintain primary natural resources and their processes.

Objective: Restore fire to the fire-dependent ecosystems in the park within the next five years.

Strategy: Achieve resource objectives through the benefits of fire in the short grass prairie community to sustain habitat diversity, and safely apply restoration treatments according to an approved schedule.

Achieve resource objectives through the benefits of fire in the pinyon-juniper woodland to sustain habitat diversity and minimize erosion, and safely apply restoration treatments as directed by an approved schedule.

Perpetuate native wildlife by maintaining natural vegetative communities.

Reduce fuel loading in designated areas of the park to prevent damaging wildland fire around cultural and natural resources, i.e. cinder cone.

Achieve resource objectives such as removal of non-native vegetation through the use of fire and, where appropriate, chemical treatments, reseeding or transplanting with native vegetation.

Continue mowing around structures to reduce the intensity of subsequent unwanted wildland fires.

Restore fire as an ecological process.

Monitor the effects of fire on the ecosystem.

Goal 6: Foster public awareness and support of the fire management program.

Objective: Provide educational opportunities for park visitors, neighbors and staff concerning the benefits of fire on the natural ecosystem; and prevent unplanned human-caused ignitions through fire prevention and education programs.

Strategy: Inform and educate through school visits, interpretive programs, public meetings, etc. Topics would include, but are not limited to, the natural role of fire, ecosystem maintenance, and fire prevention.

Involve adjacent landowners in park fire management activities where possible.

Goal 7: Protect air quality-related values across all affected air sheds in the area.

Objective: Ensure that air quality thresholds for National Ambient Air Quality Standards are not exceeded and that visibility is not reduced in adjacent air sheds.

Strategy: Air quality impacts will be addressed in the Wildland Fire Implementation Plan. Air quality objectives will be incorporated in each prescribed burn plan. Smoke impact mitigation measures will be implemented for prescribed burns and all wildland fire actions. Alternative methods (e.g., mechanical, chemical, biological, etc.) to fire use will be analyzed prior to selecting fire treatments.

C. Wildland Fire Management Options

The Monument will utilize a combination of fire management strategies to accomplish stated resource and fire objectives.

1. Wildland Fire

Under an approved FMP, all wildland fires would be suppressed using appropriate management response. Response to specific wildland fires would be based on fire behavior, values at risk, human safety, suppression costs, and the availability of fire management resources. Appropriate management response options range from the use of minimum impact tactics that limit ground disturbance to intense suppression actions on all perimeters of the fire. For example, the manager has the discretion to use natural barriers (i.e., rock outcroppings and breaks in vegetation) and human-made features such as roads and trails, to control wildland fire, as well as minimize the disturbance to vegetation and soils and decrease risks to firefighters.

All wildland fires escaping initial attack will have a Wildland Fire Situation Analysis completed in a timely manner. The plan will serve as the decision record for selection of the appropriate management response.

The park currently has no plans to implement a wildland fire use program.

2. Fuels Management

a. Prescribed Fire. Prescribed fires under a 5-year treatment schedule would restore the natural role of fire and manage fuels that contribute to the wildland fire threat. The reestablishment of fire would facilitate the restoration of native fire-adapted communities, cycle nutrients, control exotic vegetation, and maintain desired ecological conditions. All prescribed fire projects would require an approved burn plan that outlined the management objectives, prescription, resources to be used, contingencies, and mitigation required (NPS DO-18.)

b. Non-Fire Applications. Mechanical fuel reduction of hazard fuels near developments, and cultural, natural, and other resources that would be damaged in a high intensity fire will be considered for fuels management. Thinning projects would be listed on a treatment schedule and approved by NPS resource advisors and park superintendent.

Project objectives would establish defensible space, prevent wildland fires from crossing Monument boundaries, accomplish specific ecological restoration objectives and utilize prescribed fire effectively.

Chemical treatments would be used to control and/or limit the establishment of exotics following the use of prescribed fire effectively.

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

The 793 acre Monument would be considered a single Fire Management Unit (FMU.) However, two subunits have been identified because of slight differences in implementing mechanical and prescribed fire treatments; as well as different natural fire regime intervals on two different vegetative communities. For example, prescribed burning would occur on grassland areas and forest vegetation, and hazard fuels reduction projects would be conducted mainly in forested areas. The containment of invasive plants following fire would be focused on grassland areas, but not restricted to those areas.

1. Plains-Mesa grassland Subunit:

a. Unit Characteristics. This Subunit covers approximately 210 acres. Elevation is between 6910 feet and 8000 feet. Ground access is good on the secondary road leading from highway 325 to the visitor center. A fire road (not maintained) leads around the south and east half of the cinder cone. There is fair access to the boca grasslands from the cinder cone road. This Subunit is primary basalt lava with some cinder material.

Dominant vegetation in this Subunit is plains-mesa grasslands. Blue grama dominates. Other important grasses include big and little bluestem, bottlebrush squirreltail, sideoats grama, mountain and ring muhly, species of threeawn, and western wheatgrass. A variety of forbs are also important. Some grasslands adjacent to woodlands are being invaded by juniper and other woody species.

This Subunit has the most problems with exotic plants. Concentrations of common mullein (*Verbascum thapsus*), yellow sweet clover (*Melilotus officinalis*), white sweet clover (*M. alba*), and Russian thistle (*Salsola kali*) are found adjacent to the Monument road and around the visitor center area.

Monument living quarters, the visitor center, and maintenance facilities are located in this Subunit. Visitor safety and protection of facilities are high values at risk.

NFFL fuel models represented are 1 and 2.

b. Fire Management Strategic Objectives.

- Provide for public safety; protect public facilities and private property.
- Contain 95% of all wildland fires utilizing appropriate suppression response at less than 10 acres throughout the Subunit based on values at risk.
- Begin regular applications of planned ignitions to achieve resource and fire management objectives.

- Simulate fire regime cycle of every 5-15 years in grassland community through prescribed fires. Earlier cycle occurrences may be desirable to promote native vegetation back into the ecosystem.
- Use prescribed fire to help reduce exotic vegetation. If needed, treat exotic plants with a chemical application following a prescribed fire.
- Mechanical removal may be implemented to reduce the encroachment of woody species into grasslands, prevent fire from entering or leaving park boundary, and provide structure protection.
- Within 5-years reduce fuel loadings where needed to prevent damage from unwanted wildland fire.
- Monitor fire effects, air quality, natural fire cycle, and fire behavior in the park's major vegetation types. This information will be used to refine prescribed fire prescriptions, to make fire behavior projections, and to improve suppression strategies.
- Form a cooperative relationship with Monument neighbors to develop a sound fire management program that protects private and state-leased land.

2. Pinyon-Juniper/Scrub Subunit

a. Unit Characteristics. The Pinyon-Juniper Woodland vegetation community covers approximately 523 acres—over 60% of the total Monument. It includes most of the cinder cone and much of the lava boca. Elevation ranges from 7060 feet to 8182 feet. It is dominated by an overstory of Colorado pinyon pine (*Pinus edulis*) and one-seed juniper (*Juniperus monosperma*). Dominant shrubs include Gambel's oak (*Quercus gambelii*), mountain mahogany (*Cercocarpus montanus*), chokecherry (*Prunus virginiana*), and thimbleberry (*Rubus neomexicana*). Blue grama (*Bouteloua gracilis*) is the dominant grass in the understory. There are also some relatively open grassland interspaces in this community type. The presence of soil binding bunch grasses interspaced in the pinyon-juniper community is a more favorable condition for control of erosion on the cinder cone.

The Monument road to the rim of the crater and the picnic area is located in this Subunit. Visitation, therefore, is high, though most of the traffic is transient. In addition, the Monument's water system is located here, including the well and pump, the 50,000-gallon water storage tank, and the water lines.

Visitor safety and protection of facilities are high values at risk. An abundant growth of brush and the accumulation of ground fuel loading has occurred in much of this Subunit. Shoestring root rot has killed or contributed to the death of over 430 pinyon pines, adding to the problem. Catastrophic fire is possible due to fuel loading and topography. Destruction of the pinyon-juniper woodland and accelerated erosion of the cinder cone is at risk.

NFFL fuel models represented are 2 and 6.

b. Fire Management Strategic Objectives:

- Provide for public safety; protect public facilities and private property.
- Contain 95% of all wildland fires utilizing appropriate suppression response at less than 10 acres throughout the Subunit based on values at risk.
- Where continuous fuels are present within the pinyon-juniper community, begin mechanical treatments to reduce canopy cover to allow grasses to return to subunit that will protect visitor safety and reduce erosion.
- Use prescribed fires to reduce dead and down woody fuels and surface litter loading once mechanical treatments have been implemented.
- Simulate fire cycle of every 20 years in scrub and pinyon-juniper community through management ignited prescribed fires.
- Within 5-years reduce fuel loadings where needed to prevent damage from unwanted wildland fire.
- Monitor fire effects, air quality, natural fire cycle, and fire behavior in the park's major vegetation types. This information will be used to refine prescribed fire prescriptions, to make fire behavior projections, and to improve suppression strategies.
- Form a cooperative relationship with Monument neighbors to develop a sound fire management program that protects private and state-leased land.

c. Management Considerations to Operational Implementation.

- Prevention of fires leaving the NPS boundaries is a high priority.
- Protection of archeological sites from any ground disturbing suppression activities.
- The use of bulldozers or retardant is prohibited except in situations where buildings may be lost, fire threatens to leave NPS owned lands, or with the express approval of the Superintendent.
- Ensure that air quality regulations are followed in developing implementation plans.
- Ensure that sociopolitical and economic impacts are considered in developing implementation plans.
- Consult park neighbors concerning any activity that could impact them.

d. Historic Role of Fire. Fire is an integral part of the ecosystem, and the historic fire return interval is five to fifteen years in the grassland subunit and greater than 20 years in the PJ shrub subunit. Forestation of pinyon-juniper has occurred on the slopes of Capulin Volcano during the last 100 years, as documented in historic photographs. The need for fire management is evidenced by undesirable vegetation changes on Capulin Volcano. The need for an FMP

relates to fire's historical role in several Monument vegetative communities (Dick-Peddie 1993). For example, pre-settlement woodlands in this region were usually savanna-like or confined to rocky outcrops not typically susceptible to fire. Juniper woodlands began increasing in both density and distribution in the late 1800s because of climate, grazing, and lack of periodic fire as a result of suppression policies. Native American relocations also eliminated a source of ignition, and with fire exclusion, the juniper have been allowed to expand unchecked (National Park Service 2000).

The early fires were frequent enough to keep the oldest trees restricted to steep, and/or dissected topography. The ability of vegetation to carry fire on gentler topography was due to the abundance of fine fuel, mainly grasses. When grazing was excessive, fire could no longer carry and perform its natural thinning function because fine fuels were consumed as food by livestock. Shrubs and then trees increased in abundance and density, with shrubs often serving as nurse plants for tree seedlings (National Park Service 2000).

Fire is a tool for managing the geologic resources and achieving resource management objectives. Prescribed fire and mechanical thinning are two ways of managing vegetation and controlling erosion on the slopes of the cinder cone. Monitoring fire effects within the park is important in order to perpetuate ecological processes and natural conditions at the park.

Researchers from the University of Missouri Tree Ring Laboratory began a fire history research project in October 2004. Tree ring wedges and cores were collected for investigation. Results of this investigation may include the occurrences of fire in the park for the last 400 years..

Recorded Fire History: Fire history is not well documented at Capulin Volcano. The only wildland fire recorded by the NPS was the Cable Fire, which burned 0.1 acre in 1981 (National Park Service 1996). Information gathered by Gary Ahlstrand (1979) indicates that the average pre-grazing fire cycle (the time between naturally occurring fire events) was about 20 years based on a range of 6 to 34 years in the Lower Montane Coniferous Forest community. Interviews with area residents indicate that no major fires occurred on the Monument during the 20th Century (Gennaro, 1979). Tree-ring analysis of fire-damaged ponderosa pine showed a minimum of five fires in the 19th century (Ahlstrand, 1979).

Fire history, fuel models, and fire weather history will continue to be studied and analyzed at the park in an attempt to refine the fire season and fire danger period. Through interactions with local fire experts, personal contacts and on-site visits, we will continue to gather information on fire histories, land alterations, and the potential to restore the lands to a more natural condition.

e. Wildland Fire Management Situation

1. Historical Weather Analysis

Fire weather is taken daily at a station in the visitor center area. Fire weather readings have been taken since 1979 and are on file. Annual precipitation averages 16 inches, primarily due to warm season thunderstorms and winter Arctic-type systems. Showers during May through September account for 75% of the annual moisture. Typical thunderstorms tend to develop between 3:00 P.M. and 6:00 P.M. There are two primary thunderstorm tracks in this area. Convective cells usually originate west of Raton, and then move generally from west to east, with one track going down the Dry Cimarron River Valley and the other track going primarily 10-20 miles south of Capulin Volcano. Occasionally these thunderstorms will change direction and move across the Monument vicinity. Infrequently, convective cells will build right over the volcano and dump heavy rains.

Winter snows average approximately 39 inches per year and are usually dry and powdery. Moisture snow equivalent is 12-15 inches of snow per one inch of water. Heavy, wet snows occasionally fall damaging trees and sometimes causing limb breakage. This adds to wildfire fuel loading.

Summers are mild, with maximum temperatures generally in the 70's and 80's. Minimums are in the 48-54 degree range. Winter temperatures range from 10-46 degrees. Clear days, moderate winds, and strong solar radiation patterns exist.

Midday humidities are generally low. The diurnal variation in relative humidity is wide and basically inverse to diurnal temperatures. Winds are generally moderate but can be extremely strong especially on the crater rim. Winds greater than 20 MPH are from the southwest or the north. Irregular terrain is a primary factor causing spatial variation in surface winds. The nighttime period, 8:00 P.M. to 8:00 A.M., Mountain Standard Time, is characterized by stable thermal stratification; during the period of insolation (8:00 A.M. to 8:00 P.M.) the air is generally unstable. Periods of stable stratification have the poorest capacity for dilution of released effluents such as smoke.

2. Fire Season

The normal fire season for the Monument is April 15-September 15. However, these dates are averages, and periods of high fire danger can occur as early as March and as late as November.

3. Fuel Characteristics and Fuel Models

Two fuel modeling schemes, the National Fire-Danger Rating System and the Fire Behavior Prediction System, are used as guides at the Volcano. Fuels are generally continuous in the Monument and are best represented by fire behavior fuel models (NFFL) 1 and 2 in the grass and grass-dominated group and NFFL model 6 in the chaparral and shrub fields.

National Fire Danger Rating System Model L, Fire Behavior Prediction System Model #1: Fire spread is governed by the fine, very porous, and continuous herbaceous fuels that have cured or are nearly cured. Fires are surface fires that move rapidly through the cured grass and associated material. Very little shrub or timber is present, generally less than one-third of the area.

National Fire Danger Rating System Model C, Fire Behavior Prediction System Model #2: Fire spread is primarily through the fine herbaceous fuels, either curing or dead. These are surface fires where the herbaceous material, in addition to litter and dead-down stemwood from the open shrub or timber overstory, contribute to the fire intensity.

National Fire Danger Rating System Model F, Fire Behavior Prediction System Model #6: Fires carry through the shrub layer where the foliage is more flammable and requires moderate winds. Fire will drop to the ground at low wind speeds or at openings in the stand.

Further information about these fuel types can be found in:
Anderson, H.E. 1982. Aids to determining fuel models for estimating fire behavior. USDA For. Serv. Gen. Tech. Rep. INT-122. Intermt. For. And Range Exp. Stn., Ogden, Utah 84401. 22p.

4. Fire Regime Alteration

Fire generally restores or regenerates grassland systems. The grassland community at Capulin Volcano may show improved productivity within three years following burning. The season in which fire occurs as well as subsequent grazing by wildlife may affect the productivity of different plant species. The response of these plant species following fire is also dependant on precipitation.

Desired future conditions for the Plains-Mesa grasslands would expand existing acreage and reclaim areas colonized by pinyon-juniper during the last 100+ years. Native grass species would dominate with occasional forbs and shrubs. Sufficient herbaceous ground cover would stabilize soils and carry fire at intervals of less than 20 years. Non-native species cover should steadily decline. Frequent fire

may prevent the expansion of woodland species into grasslands. This is based on the perception that periodic fires burned these grasslands often enough to kill tree seedlings when they were most susceptible to fire. In the absence of frequent fire, seedlings become established in the grassland, eventually converting it to a woodland or savanna community. The effectiveness of fire in restricting the spread of pinyon and juniper thus depends on fire frequency and intensity (Pieper and Wittie 1990.)

Pinyon-juniper woodlands can support stand-replacing fires, although pre-settlement fire regimes were likely a mixture of surface and crown fire with intensities and frequencies dependent on over-story continuity or density. Of 10 fire-scarred pinyon trees collected from 3 locations in New Mexico, multiple fire scars reflected a mean point fire return interval of 27.5 years, with a range from 10 to 49 years (Gottfried et al. 1995.) Other studies in New Mexico report surface fire return intervals of 20 to 30 years and stand-wide fires occurring at 15 to 20-year intervals. The variation in fire return intervals in pinyon-juniper woodlands is the result of differences in fuel loading and vegetation composition. Where herbaceous vegetation is sparse and unable to carry fire, fire-free intervals are much longer than in areas with a well-developed under-story or greater tree density.

Desired future conditions for the pinyon-juniper woodland envision a savanna-like community that maximizes a diverse shrub and grass/forb under-story. Major tree species would include both pinyon and juniper in varying proportions. Mature tree canopy coverage would average less than 15%, with herbaceous and/or shrub ground cover sufficient to stabilize soils and carry fire at intervals of 10-15 years. These communities would typically be located on deeper and more productive soil sites where herbaceous cover can sustain frequent fires of sufficient intensity to maintain open stand structure.

5. Control Problems and Dominant Topographic features

Resistance of wildland fires to control can be high due to light flashy fuels that exist in the grassland community. In the pinyon-juniper woodland, wildland fires can be driven by high winds and steep slopes that result in high rates of spread and flame lengths.

V. Wildland Fire Management Program Components

A. General Implementation Procedures

All wildland fires will be suppressed using the most appropriate management response. The intent of this direction is to enhance safety while preventing the loss of property. The

top priority during the selection of the suppression action will be the safety of personnel and the public, including adjacent landowners.

The park has an interagency agreement with the New Mexico State Forestry to suppress all wildland fires on park-land.

Specific Wildland Fire Implementation Plan requirements are outlined in Chapter 4 of the Interagency Wildland and Prescribed Fire Management Policy Implementation Guide and will be followed by the park.

B. Wildland Fire Suppression

1. Range of Potential Fire Behavior

Fire management personnel will make fire behavior predictions by using the NFFL fuel models (Albini, 1976; Anderson, 1982; Rothermel, 1983; Susott and Burgan, 1986). Fuels in Capulin Volcano National Monument can be divided into five vegetation types. The range of potential fire behavior is based upon wind speed and humidity. Lighter winds and higher humidities will result in lower rates of spread and flame lengths; higher winds and lower humidities will result in higher rates of spread and flame lengths. Severe fires may occur during drought periods in late spring and early summer.

a. **Pinyon-Juniper Woodland and Mixed Woodland.** It is dominated by Colorado pinyon pine and one-seed juniper. Dominant shrubs include gambel oak, skunkbush, mountain mahogany, chokecherry, currants, and thimbleberry. Blue grama is the dominant grass in the understory. Over 60% of the Monument, including most of the cinder cone, is covered with this vegetation type. Due to highly variable fuel arrangement, there is a wide range of potential fire behavior. In some locations, the pinyon-juniper occurs in open stands with little grass or other fine fuels to carry a fire. In other locations, continuous herbaceous fuels under an open canopy result in fire behavior similar to that described for Juniper Savanna or Lower Montane Coniferous Forest. In yet other areas, the pinyon-juniper form closed canopy forests with dense shrub understory where low intensity fires would creep through the forest litter and high intensity torching and/or crowning would occur during hot, dry and windy conditions.

b. **Plains-Mesa Grassland.** Grasslands in the Monument are dominated by blue grama, with big and little bluestem, bottlebrush squirreltail, sideoats grama, mountain and ring muhly, western wheatgrass, and other grasses and forbs being important components in different areas. About 25% of the Monument is covered with short grass prairie. Fires will spread rapidly through the continuous fine herbaceous fuels with shrub species causing intermittent torching and short range

spotting. Once the summer rains cause the herbaceous fuels to green-up, fire spread will be limited until drying again in the fall.

c. **Montane Scrub.** The Upper and middle available moisture zones are represented in the Monument and are dominated by mountain mahogany, skunkbush (semiriparian), chokecherry (semiriparian), ribes spp., thimbleberry, and cliff bush (inside the crater). Montane scrub grows on the lower northwest portion of the cinder cone and covers about 70% of the inside crater. About 8% of the overall Monument is covered with this vegetation. Fires in this vegetation type would be expected to be intense, with fast-spreading flames involving the foliage and live and dead fine woody material in the crowns of the nearly continuous overstory.

d. **Lower Montane Coniferous Forest.** This type is dominated by ponderosa pine, pinyon pine, and gambel oak. It covers about 5% of the Monument, including parts of the boca, the region near the picnic area, and the southeast portion of the cinder cone below the road. Concentrations of down and dead fuels, reproduction and brush cause this vegetation type to burn intensely with considerable torching and short to moderate range spotting. The juniper and pinyon will also contribute to torching and spotting. During dry and hot conditions, torching/spotting cycle can be expected to be the primary method of fire spread. With the onset of the summer monsoon season, the herbaceous fuels rapidly green-up and become resistant to fire spread until they begin drying out again in the fall.

e. **Juniper Savanna.** Rapid encroachment of the short grass prairie by junipers is occurring on the lower fringes of the Monument at the present time. Juniper savanna covers about 3% of the Monument. Fires will spread rapidly through the continuous fine herbaceous fuels with woody species causing intermittent torching and short range spotting. Summer rains will limit fire spread until drying begins in the fall.

2. Preparedness Actions

a. **Fire Prevention Activities.** The National Park Service is committed to informing and educating the public about fire management activities, including fuel treatment plans, wildfire prevention, mitigation and rehabilitation, and fire's role in ecosystem management. All NPS employees at Capulin Volcano will possess a basic understanding of the FMP so that they can explain the complementary programs of fire prevention and the use of planned fire to park visitors and neighbors. The information and education programs would address a variety of audiences, and increase support for fire management activities. The fire information and education program at Bandelier National Monument would serve

as a model for the communications program at Capulin Volcano. Objectives would be designed to:

- Provide education on fire management and fire ecology;
- promote relationships between agencies, community groups, and interested non-governmental partners;
- provide accurate and timely incident information for local, regional, and national fire operations; and
- inform local communities, Monument residents and employees, about fire safety, fire prevention, defensible space, and fuels management.
- Appendix I contains a detailed fire prevention plan.

b. Annual Training. All personnel involved in fire line operations must have completed at least 32 hours of basic wildland fire training, including basic firefighting, fire behavior, and standards for survival. In addition, all personnel will receive a minimum of eight hours of refresher training annually, with an emphasis on safety.

The Area Fire Management Officer is responsible for fire training. This includes:

- Knowledge of required courses for fire qualifications;
- Recruitment of existing park staff into fire program;
- Yearly update of individual training and qualification records;
- Use of individual training records and in-park needs analysis to develop fire training schedule/needs;
- Providing required training for employees to meet minimum staffing levels specified in this plan;
- Obtaining self-study materials for applicable fire training; and,
- Coordinating with other parks/agencies to sponsor/provide training.

c. Annual Preparedness Activities. Preparedness is the process of planning and implementing activities prior to wildland fire ignitions. This process includes routine actions which are completed before the most active portion of the fire season, as well as incremental actions conducted in response to increasing fire danger.

Elements of preparedness are training, equipment and cache maintenance, record keeping, pre-attack planning, risk analysis and emergency preparedness. Each of these is discussed below. Prior to and during the fire season, the following preparedness actions will be taken to ensure adequate fire preparedness. The responsible positions for meeting specific target dates are in parentheses.

Preparedness activities for the park will be closely coordinated with the volunteer fire departments in Folsom, Capulin, and Des Moines.

Please note that the park has an Area Fire Management Officer (FMO) stationed at Lake Meredith National Recreation Area that is responsible for the overall park fire management program. The park also has a Park FMO, the Chief Ranger, to serve as the on-the-ground contact for the Area FMO.

October 1 through March 31 (All Supervisors): Qualified fire management personnel will be recruited and trained as resources and funds allow. On the job training and fire management correspondence courses will be used to upgrade the skill levels of the park staff.

January 1 through April 30 (Area FMO in conjunction with Park FMO):

- Perform fire physical exams as per standards in Reference Manual 18. Seasonal employees with fire-related responsibilities may be tested as they enter on duty;
- Give pack test to individuals who need a fitness level in order to perform duties for which they are qualified;
- Conduct annual safety refresher training;
- Review and update cooperative agreements with neighboring fire management agencies; and,
- Review step-up plan.

March 1 (Area FMO in conjunction with Park FMO):

- Complete inventory of all fire-related equipment. Worn or missing items will be ordered and replaced;
- Check established procedures for using suppression and emergency preparedness accounts; and,
- Complete and update prescribed fire plans for upcoming season and have them signed by the Superintendent. (Area FMO in conjunction with Park FMO)

March 1 through September 30 (Park FMO in conjunction with Area FMO):

- Inspect and test all fire equipment for readiness;
- Fire equipment and supplies will be maintained in serviceable condition and in constant readiness; and,
- Coordinate as needed with Folsom, Capulin and Des Moines Fire Departments concerning engine availability and staffing.

May 1 through September 30 (Park FMO): During fire season, all fire fighters and key overhead personnel will provide Fire Management Officer with their availability during off duty hours. Each employee subject to fire duty will have a fire pack available for immediate use.

November 1 through December 31 (Area FMO, Park FMO and Involved Staff)

- Critique fire season, including all fire management activities (i.e. wildland fire suppression, prescribed fires and mechanical fuel treatments, prevention, etc.) with involved personnel;
- Evaluate individual performance of park staff to correct deficiencies and recommend personnel for training;
- Review and revise FMP as needed; and,
- Update and submit fire experience and training to National Park Service Shared Applications Computer System through the Intermountain Regional Fire Management.

d. Fire Weather and Danger. Preparedness activities during the fire season are based on the National Fire Danger Rating System (NFDRS). Fire days are divided into five staffing classes according to the intensity of danger factors indicated by the Burning Index (BI).

1. Weather Station. A manual weather station located at the visitor center is used to take daily weather readings. Documentation of weather readings began when the station was installed in 1979.

2. Fire Danger Rating System. The park uses data collected by the manual weather station, entered into Weather Information Management System (WIMS) on a daily basis to determine fire danger ratings. The National Fire Danger Rating System (Deeming, et al., 1977) indicates the potential for and severity of wildfire occurrence. Break points between classes are determined by cumulative percentages of occurrence of the BI (burning index). The most critical break points occur at the 90th and 97th percentiles and define staffing classes 4 and 5 respectively. The Burning Index for NFDRS fuel model L will be used to indicate fine fuels fire dangers.

3. Staffing Classes. As fire danger increases, the Monument's fire organization's level of preparedness will increase. Preparedness actions that are defined by staffing classes tied to the BI's are contained in the Step-Up Staffing Plan (pre-suppression plan) in Appendix E. The burning index ranges were derived from fire weather data obtained from the Capulin Volcano weather station using the FIREFAMILY program.

The Superintendent may raise the staffing class one level for either predicted lightning or for holidays, special events or circumstances.

STAFFING CLASS	BI	FIRE DANGER
I	0-8	Low
II	9-18	Moderate
III	19-37	High
IV	38-40	Very High
V	41+	Extreme

Staffing Class I and II Conditions:

Fire would present a low to moderate level of control difficulty. Fires occurring at this level could be controlled with onsite forces. Wind speed and direction would determine severity of fire spread. Fine fuels would be drying. Preparedness actions are described in Appendix E.

Staffing Class III Conditions:

Fires would present a moderate level of control difficulty. Light and heavy fuels would be drying. Mop-up would be more difficult and time-consuming. Preparedness actions are described in Appendix E.

Staffing Class IV and V Conditions:

Fire would present a moderate to high level of control difficulty. Initial attack and reinforcing crews could have difficulty controlling a fire at this level. All fuels would be dry. Air temperature would be high and humidity low. Strong gusty winds would be possible. Spotting would be likely. Preparedness actions are described in Appendix E.

3. Pre-Attack Plan

The pre-attack plan is a compilation of essential fire management information, which must be available in the park's resource management office. The plan includes important information on areas of high risk, natural firebreaks, water sources, cultural resource locations, endangered species critical habitat, structures, utilities, criteria and procedures for evacuations and closures, park base maps, vegetation/fuel maps, and fire fighting resources available near the park. Advance preparation of this critical document will save fire managers considerable time during fire suppression operations. (For further information, please see RM-18, Chapter 7, Exhibit 3.)

The pre-attack plan (Appendix G) will be reviewed and revised annually by the park and/or area Fire Management Officer, Natural and Cultural Resource Management Specialists, Facility Manager and other pertinent staff.

4. Initial Attack

Visitors, neighbors, and employees will report most fires. Any park employee to whom a fire is reported must obtain complete information regarding the fire; and the name, address, and phone number of the reporting party.

The Park FMO will assure that all fire reports are promptly investigated. Initial attack on wildfires is the primary responsibility of the on-scene Incident Commander with support from the park staff. The Incident Commander will perform or designate an individual to size-up the fire. Size-up will include:

- Fire name
- Location
- Access
- Terrain and fuels
- Size of fire
- Anticipated control problems
- Values threatened
- Cause (if known)
- Weather (winds, humidity, temperature)
- Resources on fire (number and type)
- Resources needed (if any)
- Fire behavior

The Park FMO and Area FMO will be notified of a wildland fire as soon as possible. The Park FMO will supply information on any cultural sites in the area. Once a fire is located and a size-up conducted, the Incident Commander will determine the most appropriate management strategy to suppress the fire. The Incident Commander will also complete a Wildland Fire Situation Analysis if the fire escapes initial attack.

The Incident Commander will relay size-up information, request personnel and equipment as needed, and supervise suppression actions. The Incident Commander will stay current on weather forecasts and predicted fire behavior; and conduct fire operations until fire is declared out or until relieved. The Incident Commander is responsible for completion of all fire documents, including a written fire report (Department of Interior DI 1202) submitted within five days after the fire is declared out. All Incident Commanders are responsible directly to the FMO or the Superintendent.

The point of origin will be established and protected so that an investigation can determine or confirm the cause of the fire. That area should be treated as a crime scene and left undisturbed for future investigation. Vehicles observed while in

route to the fire should be noted (license number, make, color, etc.) and the information given to the investigation officer. All evidence which may indicate arson as the cause shall be protected and the investigation officer informed. The Incident Commander may request a fire investigator on all suspected arson fires.

The cause of ignition for each fire will be properly reported, using the Wildfire Cause Determination Handbook (National Wildfire Coordinating Group) as a guide. The FMO or his/her designee will be responsible for wildfire investigation and law enforcement.

The Incident Commander or designee shall keep the State and adjacent landowners updated on fires which may impact their lands and/or resources. The Superintendent and FMO will be notified whenever there is a possibility of movement of a fire from one jurisdiction to another.

After the fire has been controlled, the Incident Commander or his/her representative will map the fire. Fires will be patrolled until pronounced controlled by the Incident Commander. No fires will be left until the Incident Commander is certain that the fire will not escape existing control lines. The FMO will ensure all controlled fires are checked by 11:00 a.m. on subsequent days until he/she is comfortable that the fire is declared out.

a. Priority Setting Resources during Multiple Fire Occurrences:

1. Cultural site map.
2. Map displaying private structures near park boundary.
3. Wildlife habitat and vegetation maps.
4. Key members of park staff.

b. Criteria for the Initial Attack Response Is Consistent with the Park's General and Resource Management Plan Objectives:

- Public and firefighter safety;
- Protection of cultural, historic and natural resources;
- Protection of improvements and private property;
- Minimum fireline construction;
- Suppression resources and response times; and,
- Fire danger as determined by fuels, weather, and topography.

c. Confinement as an Initial Attack Suppression Strategy

The federal fire policy allows managers to select the most appropriate suppression

strategy. Firefighter safety should be the primary consideration when selecting the most appropriate strategy. Values at risk, probability of success, consequences of failure, cost, and management objectives, public and adjacent landowner concerns are some additional considerations in selecting the most appropriate strategy. The preferred strategy should be implemented as quickly, safely and efficiently as possible.

When confinement is determined to be the most appropriate strategy, it may *not* be used to meet resource objectives. Confinement may also be used through the Wildland Fire Situation Analysis when the fire is expected to exceed initial attack capability or planned management capability.

d. Typical Fire Response Times

Fire response time at the park will vary depending on staffing, fire management activity in the area, day of the week, and the time of day. During the period of highest activity in the fire season, when no other fires are burning and staff is available, the local engines (Folsom, Capulin and Des Moines) can respond to most fires within 1 hour or less. Reinforcements from local agencies can respond to a fire at the park within 1 hour. Air tanker and helicopter attack can typically reach a fire within 4 hours. Reinforcements from outside the immediate vicinity may not arrive until about 6 hours or more after a request is made for them. All response times are subject to availability of firefighting resources.

e. Restrictions and Special Concerns

The Superintendent must authorize the use of any off-road mechanized equipment.

Retardant is used only when a fire threatens to leave NPS lands or with superintendent's approval.

Minimum impact suppression tactics will be used when possible.

f. External Issues

Local businesses and resources will be used in support of fire management actions at the park whenever possible. The intent is to economically, politically and socially involve the community in fire management activities.

5. Extended Attack and Large Fire Suppression

If an extended attack or large fire suppression situation were to involve the park,

the fire would have to be managed in cooperation with other jurisdictions because of the size, location of the park and the predominant fuel type. The park is surrounded by private and state land, so coordination with private land owners and state is critical. The following information should be used in determining management actions and decisions:

- Threats to life, property and park resources;
- Availability of suppression forces;
- Current and expected fire behavior; and,
- Wildland Fire Situation Analysis (WFSA).

a. Extended Attack Needs. All agencies that will be affected in an extended attack, either by land ownership or resources committed, will be involved in determining what resources will be needed in order to safely suppress the fire as quickly as possible. The number and type of resources needed, and their availability and estimated time of arrival are factors that should be considered in determining extended attack needs.

b. Implementation Plan Requirements. A Fire Complexity Analysis will be prepared concurrently with the WFSA to assist Monument staff and State with determining the level of incident management necessary to safely and efficiently implement the selected strategy. The format and procedures for completing the Fire Complexity Analysis are found in NPS-18, Chapter 8, Exhibit 4.

The WFSA and Fire Complexity Analysis will be reviewed daily by the Superintendent, Chief Ranger, State Representative, and the incident management team to determine if the documents adequately address the current fire situation. If they are no longer valid, a new WFSA and Fire Complexity Analysis will be prepared.

Procedures for managing the transition to an incident management team are outlined in the Standard Delegation of Authority, Incident Management Teams and Briefing Package (Appendix G). Additional procedures are identified in NPS-18, Chapter 8, pages 5-8. Emphasis will be given to actions, which maximize personnel safety and the protection of natural and cultural resources. Procedures will also insure that designated Monument personnel attend all planning and strategy sessions and are promptly consulted on all issues which may affect the management of the Monument.

c. Complexity Decision Process. See Reference Manual 18, Chapter 9, Exhibit 2 for a complexity decision chart.

d. “Delegation of Authority” for Incident Commander. Whenever an Incident Commander from a cooperating agency manages a fire within the park’s boundaries the Superintendent must provide a written limited delegation of

authority and a briefing package.

6. Exceeding Existing Wildland Fire Implementation Plan

If a wildland fire exits or threatens to leave the park or if initial attack objectives are not met after 24 hours, the fire must be considered in extended attack and a new strategy must be selected in accordance with the Interagency Wildland and Prescribed Fire Implementation Guide. A Wildland Fire Situation Analysis should be initiated at this point.

7. “Minimum Impact Suppression Tactics”

Fire management activities in the park will be conducted in such a way as to cause the least amount of impact to the resources. The use of minimum impact suppression will be stressed to all suppression forces working within the park. The Wildland Fire Situation Analysis and Delegation of Authority are the key elements to insure that minimum impact suppression occurs. Critical natural and cultural resource protection issues will be identified in all WFSAs. Delegations of Authority will contain specific minimum impact suppression requirements. Incident management teams will be informed that their compliance with resource protection and minimum impact suppression requirements will be a primary component of the team's evaluation using sound suppression strategies and tactics.

Delegations of Authority will also identify a Resource Advisor for each incident management team. Resource Advisors will provide teams with appropriate minimum impact suppression guidelines in daily operational period plans and briefings. Resource Advisors will also conduct reconnaissance of the fire area to identify sensitive resources, observe suppression actions and insure that minimum impact suppression guidelines are being implemented. Methods and equipment used will be commensurate with the prevailing and predicted fire behavior. The strategy selected will be that which least alters the landscape or disturbs natural and cultural resources while safeguarding human lives. Minimum Impact Suppression Tactic guidelines can be found in Reference Manual 18, Chapter 9, Exhibit 5. Examples of minimum impact suppression include:

- Use water instead of fire retardants. If retardants are needed, a product such as Poscheck which is considered to be non-fugitive will be used;
- Cold trail the fire edge when practical;
- Wet lines or natural fuel breaks will be used wherever possible in lieu of hand-line construction if water and pumps are available;
- Utilize soaker hose, sprinklers or foggers in mop-up. Avoid boring and hydraulic action;

- Firelines will be kept to the minimum width necessary to allow backfiring or safe blackline to be created. Use natural and existing human-made barriers whenever possible;
- Decisions on suppression actions will be made by the Incident Commander within the scope of the delegation of authority;
- Minimize cutting of trees;
- Archeological sites will be identified prior to a fire and protected wherever possible. Minimize ground disturbance to protect cultural resources. Report to Cultural Resource Specialist all fireline construction around archeological sites;
- Scatter or remove debris as prescribed by the Incident Commander; and,
- All firelines, spike camps, and other disturbed areas will be rehabilitated to return the site to the way it appeared before the incident.

8. Rehabilitation

Because fire is a vital process that shapes the ecosystem, the effects of fire are generally considered natural and accepted as part of the process. However, fires and suppression activities can result in disturbance that requires mitigation. The most effective rehabilitation measure is careful planning and skilled implementation of minimum impact suppression techniques.

For initial attack fires, rehabilitation needs should be limited and will be determined and implemented by the Incident Commander and FMO. For larger fires with incident management teams, rehabilitation requirements may be more substantial. A rehabilitation plan will be prepared by the team in conjunction with the Resource Advisor and Agency Representative for approval by the Superintendent. The plan will be submitted in a timely manner so that rehabilitation work can be completed by resources already assigned to the fire.

The overriding philosophy for rehabilitation is that the minimum treatment necessary for the stabilization of the burn and other impacted areas be used. Specific rehabilitation standards will be identified in individual rehabilitation plans.

General guidelines for rehabilitation include:

- Water bars will be installed on firelines where necessary to prevent erosion.
- Brush and other existing organic material will be moved back onto firelines.
- All stumps except oaks will be flush cut.
- All signs of human activity will be removed (litter, flagging, etc).
- Campsites, helispots and other locations will be restored to natural conditions as much as possible.

- Burned areas may not be seeded. Residual seed and sprouting from surviving root stalks will provide natural regeneration.
- All litter and trash in the vicinity will be removed after a fire is declared out.
- Firelines will be refilled and erosion control devices will be installed, if necessary. The severity of the burn and its resulting impacts will be considered when determining the need to re-establish native plants.
- In the case of very large fires, a Department of Interior Burned Area Rehabilitation Team will be requested.

9. Records and Reports

The FMO is responsible for all fire management records and reports.

a. Individual Fire Report. Reports and records will be held permanently in the Chief Ranger Office and Lake Meredith NRA Fire Management office. An Individual Fire Record (Department of Interior Form DI 1202) will be completed for all wildland fires, including planned ignitions and research fires. Copies of reports will be forwarded promptly to appropriate cooperating agencies and the Intermountain Regional Office.

The form for documenting a wildland fire is the Individual Fire Report (DI 1202). The report provides a historical record of the fire regime for the park. All fires within the boundaries must be documented with this form, including fires that go out on their own. The form is also used by the Department of Interior to record fire occurrences. Support actions in which park personnel respond to fires outside the park (including out of state) are also to be reported on this form. The NPS must have a DI 1202 with an incident number on file for firefighters to receive credit for work performed on any fire.

The Incident Commander for the fire is typically the person responsible for preparation of the individual fire report. In most cases, this is the individual who put the fire out. That person may also complete a Case Incident Report (Form 10-343). The FMO will assign each fire a number. Instructions for filling out the report are found in Reference Manual 18.

For large fires, a complete fire report will include, as applicable:

- Written policies, guidelines or authority statements signed by the Superintendent;
- Copies of equipment purchased or personnel request orders;
- All situation maps;
- Personnel lists, including emergency firefighter time slips;
- Press clippings;

- Accident reports;
- All weather data reports and records;
- Documentation of financial charges made against the incident; and,
- Rehabilitation plan.

The completed individual fire reports are submitted to the Area FMO who will review them and enter the report into the National Park Service Shared Access Computer System.

b. Training and Experience Records. The National Park Service Shared Applications Computer System located at the National Interagency Fire Center is the central repository for all individual fire experience and training records. The Area FMO is responsible for entering all training and experience data into the computer, and for ensuring that the information is current.

c. Daily Situation Report. Daily situation reports are required on those days when the fire danger index reaches the 90th percentile and the park moves into Staffing Class IV and V, or when a fire has started or is on-going. The park will notify the FMO, who will enter the report into the NPS wildland fire management computer system by 9:30 am the following day.

d. Resource Order Form. All assistance requests must be documented on the Resource Order Form (National Fire Equipment Schedule Form 1470). These forms can be transmitted by telephone. The order form is an obligating procurement document.

C. Wildland Fire Use

A wildland fire use program will not be implemented at this time due to the small acreage of the Monument and the small staff that lacks qualifications to run such a program.

D. Prescribed Fire

Prescribed fires are fires intentionally ignited to accomplish resource management objectives. The Monument will employ this strategy to achieve the following objectives:

1. Hazard Fuels Reduction: This strategy employs a treatment using fire, or a combination of mechanical removal and fire to protect identified values at risk. This would include protection of physical resources and ensuring public safety.
2. Resource Management Fires: This is used as a tool to accomplish specific natural (or cultural) management objectives. This may include restoration burns intended to re-establish the fire interval for a given area based on fire history studies, maintain short grass prairie, or burns designed to reduce or eliminate exotic species.

A list of burns to be completed in the next five years can be found in Appendix H.

Planned ignitions will be conducted in burn units and within specified weather and fuel moisture parameters. Prescriptions may be adjusted as deemed necessary by monitoring results, information gained from research burns, and further refinement of the planned ignition program. Some burning of units not consistent with the five-year plan may occur to achieve a desired fuel condition level. Some units may be put in a two-year burn cycle prior to a five-year rotation due to the lack of a natural fire cycle already in place. This will not occur in every unit and the five-year plan will be considered the guide for implementing prescribed fire units.

Research burns may be conducted with approval of the Superintendent and must meet all requirements of any other planned ignitions.

Each planned ignition will be monitored in order to maintain current information on fire size, location, rate of spread, intensity, and potential threats, which might require suppression actions in the event of an escape. Fire effects monitoring will also be implemented to the standards of the 2001 NPS Fire Monitoring Handbook.

Prescribed fires will be used to increase safety both for park visitors and neighboring homes by reducing fuel loads.

1. Planning and Documentation

a. Burn plans should be prepared well in advance of the ignition. The Superintendent must approve all prescribed burn plans prior to any ignition. In addition, the Fire Management Officer from Lake Meredith National Recreation Area will review all proposed prescribed fire burn plans. A burn plan may have multiple burn units if these units have similar vegetation types, burn prescriptions, and resource management objectives.

Prescribed fire burn units may vary in size, but the larger units better assist in landscape scale restoration. Prescribed fire boundaries should use the natural features (slope, aspect, and vegetation), natural fuel breaks, private/state land, and roads and trails for perimeter control. Proposed construction of perimeter fire control lines should be evaluated for impacts to natural and cultural resources, cost, and defensibility. Boundary fence lines are often costly to construct, and they increase risk to firefighter safety during holding operations.

Each year, the Area FMO and Chief Ranger will prepare a plan identifying all planned ignitions to be conducted at the park. Objectives, acreages, fire team members, private and state landowners affected or utilized, and target dates will be stated for each fire management unit. Approval of the annual burn program

does not constitute final approval of individual burn plans.

All planned ignition projects will have an approved burn plan containing measurable objectives, predetermined prescriptions, agreements with state and private landowners, air quality permits, press releases, environmental compliance documents, operational procedures to properly prepare for and safely conduct a planned ignition, and contingency actions in the event that prescription is exceeded.

b. Long-term Prescribed Fire Strategy. Fire has been eliminated from its natural role in the park ecosystem for many years. The current NPS policy is directed toward the establishment and maintenance of natural ecosystem processes to the fullest extent possible. It must be remembered that vegetation change over the local landscape has not occurred with predictive regularity since pre-settlement times.

Planned ignitions will be used to restore native species, maintain the fire-dependent natural community, and achieve management objectives.

This will be done through a rotational series of burns that will be conducted as needed and eventually will coincide with the historic return interval. A 5-year burn schedule will be developed as an amendment to the FMP and will be reviewed annually. The grassland units may be put in a two year burn cycle prior to a five year rotation due to the lack of a natural fire that will allow native vegetation to return to a natural state, i.e., warm season grasses and cool season grasses.

Each prescribed burn unit will be monitored to identify ecosystem response to fire after burns. Emphasis will be placed on refining prescriptions to meet the intended objectives for each fuel model.

c. Necessary Personnel. This prescribed fire management program will be planned and executed by qualified personnel as determined by National Wildfire Coordination Group standards and will follow the guidelines in Reference Manual 18.

The park does not have sufficient qualified staff to independently implement prescribed burns. The area FMO and adjacent agencies must assist in prescribed burn planning and execution.

1. Debris Burns

If a simple, isolated burn is proposed that has virtually no chanced escape,

presents no safety or resource threats, and is an established practice, neither re-carded personnel or a formal prescribed burn plan will be required (See Reference Manual 18, Chapter 10, page 4). An example would be burning slash piles. Park personnel will, however, coordinate with the Area FMO prior to ignition.

All personnel involved in such burns should wear appropriate personal protective equipment: boots, Nomex shirt and pants, gloves, and hardhat. The project supervisor is responsible for making all necessary notifications (local fire departments, air quality contacts, neighbors, etc.), obtaining all permits, and developing an appropriate safety and evacuation plan to enact in case of injuries or other emergencies. The burn crew must include someone who has previously conducted a similar burn.

2. Planned Ignitions

All planned ignitions will be implemented under the direction and standards specified in the Reference Manual 18 (Chapter 10). All positions on planned ignitions will meet national requirements for training and experience, as described in Interagency Red Book and PMS 310-1 (DOI qualifications and experience manual).

A Prescribed Fire Burn Boss is required to conduct every burn. The Prescribed Fire Burn Boss may be from another agency as long as he/she is qualified to burn the fuel type of the proposed burn. Depending on the complexity of the burn, as determined by the Prescribed Fire Burn Boss and Complexity Element Rating Criteria, other overhead positions (Ignition Specialist, Lead Monitor, Information Officer and Safety Officer) will be filled as needed. The burn boss will determine the number of prescribed fire crewmembers and resources needed. Crewmembers will all be qualified as at least a Type II Firefighter.

Assistance with filling the above positions can be obtained from Lake Meredith National Recreation Area, nearby federal or state agencies, and NPS Fire Use Modules.

The Area FMO will obtain necessary burn permits from the New Mexico State Forestry and the New Mexico Department of Air Quality. Nearby landowners and other interested parties, such as the Sheriff's Department or area fire departments, will be notified prior to and on the day of the planned ignition.

d. Prescribed Fire Monitoring. All prescribed fires must include an adequate number of prescribed fire monitors to record site weather, smoke dispersal, and fire behavior; and to collect data from the plots in the burn unit as specified in the NPS Fire Monitoring Handbook (2001). A prescribed fire monitoring report that

includes weather observations, fire behavior observations, ignition pattern, and immediate post fire effects will be completed for each burn. Monitoring critiques will be held after prescribed fires have been completed.

Fire weather will be recorded at least one day before the planned ignition. Collection of fuel moisture will be done as needed, based upon the season of the burn. Fire weather observations will be collected during ignition and burning phases on an hourly basis or at an interval suitable to the prescribed fire burn boss.

1. Fire Behavior Monitoring - Lack of knowledge during critical phases of fire development can lead to errors in management. Fire behavior monitoring of planned ignitions is important and necessary for three reasons:

1. To keep fires within predetermined criteria;
2. To know when to take suppression action; and,
3. To protect human life and/or property.

Fire behavior monitoring information will include:

- Topographic Variables
- Percent slope
- Aspect of terrain
- Fire Weather Variables
- Air Temperature
- Relative humidity
- Wind speed
- Wind direction
- Percent shading and cloud cover
- 10-hour time lag fuel moisture
- Live fuel moisture
- Drought index
- Fuel Models
- Identify fuel(s) that are carrying the fire
- Fire Characteristics
- Linear rate of spread
- Perimeter and area growth
- Flame length
- Fire spread direction
- Flame zone depth
- Smoke Characteristics
- Visibility
- Total smoke production
- Mixing height
- Transport and surface wind speeds and direction
- Documented complaints from downwind areas

2. Immediate Post Fire Effects Monitoring - Immediate post fire effects monitoring will provide information on vegetative change and other desired variables. Monitoring may include the use of index plots and transects to be monitored prior to and after fire to the standards of the NPS Fire Monitoring Handbook (2001). Monitoring needs not met by the Handbook will be developed by the park in conjunction with the Area FMO and regional office.

e. Prescribed Fire Critique Format. The Prescribed Fire Burn Boss will conduct a critique of each prescribed burn with personnel involved in the project. This will be done as soon as possible after the burn has been completed. Topics to be covered in the critique include:

- Safety concerns and issues;
- Attainment of burn objectives;
- Logistics;
- Planning process;
- Tactics and operations;
- Ignition plan;
- Holding plan;
- Monitoring plan;
- Predicted weather/behavior vs. actual weather/behavior; and,
- Recommendations for future projects.

The discussion of these issues will be summarized by the Prescribed Fire Burn Boss and included in the final planned ignition report.

f. Documentation Requirements. The Prescribed Fire Burn Boss will be responsible for completion of the final planned ignition record 10 days after the burn is declared out. The record will include:

- Individual Fire Report (Department of Interior Form DI 1202);
- Burn Narrative;
- Monitor Report;
- Cost Summary;
- Fire Map;
- Fire Critique/Recommendations for future burns;
- Unit logs filled out by burn personnel; and,
- Any other pertinent information about the burn.

Individual burn plans will be kept on file in monument headquarters. Each plan will include information on the pre-burn site inspection prescription, site treatment and monitoring, and the post-burn evaluation and monitoring.

All planned ignition activities will be documented on the form Individual Fire

Report (Department of Interior Form DI 1202) and forwarded to Lake Meredith NRA for entry into the National Park Service Shared Access Computer System. In addition, a post-burn analysis must be filed with the prescribed burn plan.

g. Map of Historic Fuel Treatments. No map of historic fuel treatments presently exists, but once treatment projects have been executed a GIS fuels treatment layer will be developed by the Lake Meredith Fire GIS specialist.

h. Prescribed Fire Burn Plan. The park will use the template burn plan provided in Reference Manual 18, Chapter 10, Wildland and Prescribed Fire Management Policy and Implementation Procedures Reference Guide.

2. Exceeding Existing Prescribed Fire Plan

There may be prescribed fires where the implemented prescribed fire is unsuccessful. In these situations the park will follow RM 18, Chapter 9, to develop a Wildland Fire Situation Analysis, and management must respond using the most appropriate suppression action. Spot fires would not constitute an escape if they are contained within standards identified in the burn plan.

3. Air Quality and Smoke Management

Air quality is an issue because the Monument is located near the communities of Folsom, Des Moines and Capulin as well as U.S. Highway 64/87. Burning will be discontinued if smoke from prescribed burns threatens to adversely affect any of these receptors. Guidelines, including monitoring thresholds, for mitigation of possible visibility impairment on the highway will be written into all burn plans.

a. Pertinent Air Quality Issues. The smoke produced by fire is about 90 percent water and carbon dioxide. The remaining emissions vary, depending upon factors such as type of fuel, moisture content, fire intensity, and chemical reactions between the elements released by fire (US Fish and Wildlife, 1995). Other common emissions include carbon monoxide, nitrogen oxides, aldehydes, complex hydrocarbons, sulfur oxides, ozone and organic oxidants (Johansen et al, 1985; Sandberg and Dost, 1990.)

The Environmental Protection Agency has set National Ambient Air Quality Standards 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): CO 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. Smoke will be monitored for trajectory, mixing height, and impact to air quality. New Mexico State Air Quality will be contacted before the implementation of any burning activities within the Monument. All air quality regulations will be followed, and applicable permits will be obtained prior to project implementation.

Goal 1: Park staff and visitors will be protected from unhealthy levels of air pollution from prescribed fires.

Objective: Do not exceed ambient concentrations of particulate matter (PM10 and PM2.5) established by the Environmental Protection Agency National Ambient Air Quality Standard.

Objective: Keep ambient concentrations of carbon monoxide measures below the Environmental Protection Agency National Ambient Air Quality Standard.

Strategy: Use state-of-the-art fire management practices to foster smoke

dispersion or limit the size of the burn to reduce particulate matter. The Simple Approach Smoke Estimation Model (or equivalent) will be used to estimate particulate matter and carbon dioxide concentrations and to ensure that the proposed prescribed fire does not cause National Ambient Air Quality Standard violations. On-site monitoring will be conducted to determine particulate matter concentrations and smoke dispersion for burns that could significantly affect the local air shed for more than one burning period. Monitoring may be conducted using air quality instruments or by visual observation.

Goal 2: Average visibility in the park will not be impaired to such an extent that the neighboring air shed is seriously affected.

Objective: Smoke plumes will disperse within ten miles downwind of the fire as observed from a point perpendicular to the smoke trajectory.

Strategy: Management practices will foster rapid transport and dispersal of smoke. Ignition will be timed to maximize dispersion and to limit smoke production during those times of day when air mixing is less likely.

c. Smoke Management Practices.

- Burn when meteorological conditions allow for good smoke dispersion.
- Use ignition techniques that produce high intensity fires with short duration impacts when possible.
- Ignite burns under good-to-excellent ventilation conditions, and suspend operations under poor smoke dispersion conditions.
- Consider smoke impacts on the local community, roads and highways.
- Implement burns specifically to meet resource management objectives.
- Minimize smoldering by considering fuel moisture.
- Implement maintenance burning in a periodic rotation to mimic natural fire cycles and reduce excessive fuel accumulations.

E. Non-Fire Applications

1. Mechanical Treatment and Other Applications.

Thinning projects will be listed on a treatment schedule and approved by NPS resource advisors and park superintendent. Project objectives would establish defensible space, prevent wildland fires from crossing Monument boundaries, and accomplish specific ecological restoration objectives. Woody material would be thinned to increase species diversity and expand areas of native grasses and forbs. To increase herbaceous cover on the cinder cone, the over-story canopy in the pinyon-juniper community would be opened. Small areas of canopy would be opened and monitored for the emergence of grasses and shrubs. Fewer than 10 trees per acre would be thinned. Pinyon and juniper trees with a 9-inch or greater diameter would not be removed. Branches on these trees would be limbed no higher than four feet above ground. Any ponderosa trees in the

project zone with a 4-inch or greater diameter would not be removed and would be limbed-up no higher than four feet above ground. Some trees will be flagged and left and some vegetation stands, such as mountain mahogany, would be flagged as no cut areas. Trees to be thinned, trimmed, or removed would be identified by the NPS.

This strategy includes the use of mechanical equipment (tracked or wheeled mulchers, spreaders, cutters and grapplers) where road access exists; and/or manual (hand-carried) tools such as handsaws, chainsaws, axes or scraping tools, in off-road areas around and on the cinder cone. For purposes of this analysis, chainsaws are considered “manual tools.” All cut material would be stacked and burned in open areas when conditions allow. Woody material thinned from slopes of the cinder cone would be removed in a manner to minimize surface disturbance. It may be desirable to burn slash piles on the volcano rather than increase disturbance by dragging material down the steep loose slopes. In selected locations, where access routes are available or burning is not possible, the debris would be removed and used for Monument projects, put up for bid as firewood, or used as goods-for-services payment for treatment activities.

Herbicides would be used to control and/or limit the establishment of cheatgrass, *Bromus tectorum*, following the use of prescribed fire. Cheatgrass, a cool season annual grass, emerges in the fall, winter, or early spring depending on moisture regime. The use of two chemicals, imazapic, trade name Plateau®, or glyphosate, trade name Roundup®, are effective on cheatgrass, and would reduce proliferation throughout the Monument. Imazapic can be used as a pre-emergent or post-emergent, applied to bare ground prior to seed germination and foliar growth, or applied to the foliage after the plant has emerged. Ideally, imazapic, a selective herbicide, would be used directly on the cheatgrass foliage. Glyphosate is a nonselective herbicide and would be applied after emergence in the fall or spring. Glyphosate would be applied to monoculture stands of cheatgrass after which reseedling or revegetation would occur.

a. Annual Program Activities. The use of mechanical fuels reduction will be considered on land parcels where fuel loads cause a concern with the ability to safely and effectively keep fire within National Park Service boundaries; and/or as a treatment to allow for the practical use of prescribed fire. The decision to use mechanized treatments will be evaluated based on the individual treatment plans for each unit. A plan will be developed for each project.

The use of herbicides following an early spring burn is most desirable. The area would be monitored after the fire and during the cool growing season for cheatgrass emergence and density. After determining these parameters, an herbicide would be selected and applied before the plants reached the four-leaf stage. During the rest of the year, monitoring of the burn site would continue so that the effectiveness of management actions would be evaluated and information gathered for future prescribed fire events.

b. Equipment and Seasonal Use Restrictions. Restriction on mechanical treatment will be made to reduce machinery impact on natural and cultural resources.

Herbicidal treatments could occur in the spring or fall, depending on the herbicide used. If cheatgrass becomes intermixed with native grass, Plateau® herbicide would be applied in the fall. Plateau® does not destroy native grasses and would be most effective in this instance. If monocultures of cheatgrass develop, Roundup® herbicide would be used.

c. Necessary 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 (2001) for both mechanical and herbicidal treatments.

d. Critique of Mechanical Treatment Projects. Upon completion of treatment with forestry mowing or cutting equipment, park staff will inspect the site to determine if contract specifications were sufficient to achieve resource management goals.

e. Cost Accounting. All costs charged to project will be tracked by the park and entered into the National Interagency NFPORS reporting system.

f. Reporting and Documentation. Project progress, accomplishments, and completion reports will be entered into the National Interagency NFPORS reporting system. A project file will be kept by the park for documentation purposes. Success stories will be completed once treatments are complete.

g. Annual Planned Project List. A 5-year treatment schedule will be developed as an amendment to the FMP and will be reviewed annually by the Monuments Chief Ranger in consultation with Monument staff and Area FMO.

F. Emergency Rehabilitation and Restoration

Because fire is a vital process that shapes the ecosystem, the effects are generally considered natural and accepted as part of the process. However, fires and suppression activities can cause disturbance that requires mitigation. The most effective rehabilitation measures are careful planning and skilled implementation of minimum impact suppression techniques.

For initial attack fires, rehabilitation needs should be limited, and determined by the

Incident Commander and FMO. For larger fires with incident management teams, rehabilitation requirements may be more substantial. A rehabilitation plan will be prepared by the Burn Emergency Area Rehabilitation team (BEAR) team, in conjunction with the Resource Advisor and Agency Representative, and approved by the Superintendent. The plan will be submitted in a timely manner so that resources already assigned to the fire can complete rehabilitation work.

The overriding philosophy for rehabilitation is that the minimum treatment necessary for the stabilization of the burn and other impacted areas be used. Specific rehabilitation standards will be identified in individual rehabilitation plans.

Emergency rehabilitation and restoration following a prescribed fire or mechanical treatment should be minimal due to lower weather parameters and minimum impact standards utilized in executing the treatments. Exceptions would be re-seeding following pile burning or re-seeding a cheatgrass colony following a prescribed burn.

However, if a large wildfire, prescribed fire or mechanical fuel treatment requires substantial rehabilitation and restoration, the park will utilize the standards listed in Appendix L and follow the Interagency Burned Area Emergency Stabilization and Rehabilitation Handbook.

VI. ORGANIZATIONAL AND BUDETARY EXAMPLES

A. Organizational Structure of Site's Fire Management Program

The park does not have a formal fire management organization. The Area FMO reports to the Superintendent, and provides oversight and assistance as described in this plan. Lake Meredith National Recreation Area will provide additional support.

B. FIREPRO Funding

FIREPRO (fund 85) is the mechanism for funding requests and resource allocations for the NPS fire management program. The Park FMO manages all FIREPRO funding for the park. The Area FMO requests and reports funding through NFORS for fuel projects and SACS for suppression related activities. Funding is available for personal protective equipment and training on an as-needed and available basis.

C. Fire Management Organization in Relation to Park Organization

The Lake Meredith National Recreation Area FMO is the point person for fire management at Capulin Volcano. This person is responsible for coordinating with the Intermountain Region Fire Management Office and Fire Management Program Center. The Chief Ranger designated as the Park FMO, is the primary on-the-ground contact for

the Area FMO.

SUPERINTENDENT: is responsible for the overall program direction;

- Has final decision making authority for fire management operations;
- Approves Escape Fire Situation Analysis;
- Delegates authority;
- Signs Interagency Agreements pertaining to the Monument
- Functions as the Monument's Public Information Officer and Agency; Representative during complex wildland fires;

CHIEF RANGER/PARK FMO: Responsible for daily oversight;

- Advises the Superintendent on significant activities, recommends policy and procedural changes, and provides supervision of Interpretive, Resource Management and Protection functions;
- May need to perform the role of supervisor; providing day to day supervision of the Monuments fire trained staff, including fuels project work, suppression activities, severity resources and prescribed fire operations;
- Advises management regarding staffing and organization needed for all fires and firefighters meet NWCG qualification standards;
- Advises the Superintendent and Area FMO immediately if a fire situation develops which is too complex in size and scope to be handled by area resources;
- Develops and maintains fire agreements with local cooperators. Serves as the park representative in cooperative relationships with outside agencies. Serves as liaison to the Taos Zone coordination center and reports firefighter availability for national call-outs through the zone;
- Performs public relations duties.
- Completes success stories on all fire related topics;
- Drafts resource management objectives involving fire's role in the ecosystem; identifies priorities for the use of fire as a management tool, including planning, research, compliance, mitigation, and rehabilitation standards if indicated;
- Oversees the development and implementation of the fire monitoring program, and documents fire effects, as well as other ecological variables.
- Prior to fire season inventories cache and fire equipment; meets with local fire departments; updates fire personnel and phone number roster; and performs pack tests and physicals;
- During the fire season, downloads WIMS data to determine daily fire dangers and implement step-up plan in coordination with Area FMO. Incorporates fire prevention operations and recommends closure of areas or restriction of use when fire danger reaches critical levels;
- Provides Area FMO 1202's and qualification records, training and cache needs throughout the year;
- In coordination with Area FMO, determines fuel treatment projects for next fiscal year and updates Fire Management Plan annually;

- Ensures park fire personnel are familiar with park's fire management plan;

FIRE MANAGEMENT OFFICER/AREA FMO: is stationed at Lake Meredith National Recreation Area in Fritch, Texas.

- Serves as a staff specialist in all wildland fire and prescribed fire related program elements;
- Performs and/or oversees the completion of all general program management functions including planning, budgeting, staffing needs analysis, training, qualifications and physical fitness, interagency coordination, fire prevention, hazard fuels management, fire detection, normal and emergency preparedness levels, prescribed burning, and oversight of the park initial attack function;
- Advises the Superintendent and Chief Ranger, providing current situation reports and providing technical advice and recommendations. Enters 1202's, trainings and qualifications into computer system. Issues red-cards to firefighting personnel;
- Formulates and reports annual Firepro budgets;
- Prepares severity requests to Regional Office during extreme fire danger conditions to increase staffing levels;
- Prepares and/or oversees preparation of prescribed fire plans, analysis, wildland fire situation analysis, and delegation of authorities;
- Prepares and administers the Fire Management Plan and the annual reviews with the Park FMO to incorporate any necessary changes;
- Serves as liaison with overhead teams operating in the park. Maintains liaison with the Fire Management Officer in Intermountain Regional Office;

INTERPRETATION:

- Contacts the public, updates web site, drafts notices and press releases, and distributes information about fire ecology and Monument fire management program;
- May be asked to direct traffic and fill other positions where qualified, such as fire dispatcher. Red-carded individuals may be used in initial attack;
- Education

ADMINISTRATIVE CLERK (TEMPORARY DISPATCHER):

- Duties include radio and telephone operation, dispatching, record keeping, computer operation, and coordination for field personnel;
- Assist Public Information Officer with contacting the media and distributing information;

ADMINISTRATIVE OFFICER:

- Primary duties include keeping time cards and functioning as contracting officer;
- Accountable for all FIREPRO funds related to projects;
- Oversees procurement of needed equipment and personnel;

MAINTENANCE:

- Patrol Monument by vehicle and on foot;
- Report location of fires to fire trained resources. Red-Carded individuals will be used on initial attack;
- Maintain the Monuments fire equipment, including a slip-on pumper fire vehicle;

D. Fire Plan Assessment and Approval by Park Superintendent

The Superintendent is responsible for the approval of all planning documents pertaining to fire management actions. The Superintendent will certify in writing each day of a prescribed burn that resources and funding are available to manage the fire. The Incident Commander will apply the decision criteria each day during a planned ignition or managed unplanned ignition to ensure that the criteria are being met.

E. Interagency Coordination

Interagency coordination and cooperation with the State, U.S. Forest Service, and the towns of Folsom, Capulin, and Des Moines are integral to successful implementation of the fire management program at the monument. All wildland and prescribed fires will require external support by interagency cooperators and/or other NPS units.

Neighboring agencies, upon request, will provide assistance with emergency fire suppression while adhering to the suppression and mop-up standards of the Monument. When assistance is provided, the requesting park may reimburse the other based on actual costs. When land of one unit is threatened by fire on the other, the threatened unit may reinforce or relieve the unit at the scene without expectation of reimbursement. Upon request, each unit will provide the other with fire reports, incident reports, and other pertinent records related to the agreement.

When a fire crosses or there is an imminent threat of crossing jurisdictional or agency boundaries, a unified command may be established by involved agencies.

Each unit will keep the other informed of changing conditions within its unit. An Annual Operating Plan will be written delineating mutual threat zones, policies, standards and procedures for arson investigation, communications and reports.

F. Key Interagency Contacts

- New Mexico State Forestry
- Community of Folsom, New Mexico
- Community of Des Moines, New Mexico
- Community of Capulin, New Mexico

- U.S. Forest Service, Kiowa National Grasslands

G. Fire-Related Agreements

The Monument has an agreement with New Mexico State Forestry Division for mutual aid response on Monument and State property on initial attack wildfires (Appendix E). An agreement with the U.S. Forest Service will be completed in the near future and reviewed annually. The agreement purpose is to assist the Monument with successful coordination of fire management.

VII. MONITORING AND EVALUATION

A. Monitoring Requirements

With the assistance of the Bandelier Fire Effects Monitoring Team, a short and long-term monitoring program will measure attainment of prescribed fire objectives. Qualitative and quantitative changes in resources will be measured and results will be used to guide modifications for subsequent prescription treatments.

Long-term fire monitoring will measure the influence of fire on ecosystem structure and dynamics, identify areas for future research, and validate the use of fire in perpetuating the park ecosystems. The variables to be monitored will be those that have been determined to be primary indicators of long-term change. The park will determine primary indicators by examining fire management goals and objectives and by consulting with fire effects specialists.

Short-term monitoring will follow the procedures and protocols established in the NPS Fire Monitoring Handbook (2001). Short-term monitoring will also determine if burn unit objectives, such as the elimination of non-native plant species, have been achieved.

Evaluation and interpretation of fire effects monitoring is the joint responsibility of fire and resource management personnel. Interpretation of monitoring results will be used to influence management decisions.

B. Fire Monitoring

The NPS Fire Monitoring Handbook (2001) will be used as a guide for the park's monitoring program. Four monitoring levels will be implemented: reconnaissance, fire conditions, immediate post fire effects, and long-term change. Monitoring of wildland and prescribed fires would involve the systematic collecting and recording of data on

fuels, topography, weather, air quality, and fire behavior. Monitoring would be conducted by the Fire Effects Monitoring/Fire Ecology Program from Bandelier National Monument. Fire monitors would be trained and certified in both basic fire behavior and prescribed fire-monitoring techniques. Monitoring results would determine whether actions had the desired effect, whether more information is needed, and whether modification would be needed to meet management goals and objectives. The Lake Meredith NRA FMO and the Intermountain Region Fire Ecologist will be consulted when developing the fire-monitoring plan for the park.

C. Fire Monitoring Plan

See Appendix F for this plan.

VIII. FIRE RESEARCH

A. Completed Research

Fire history is not well documented at Capulin Volcano. The only wildland fire recorded by the NPS was the Cable Fire, which burned 0.1 acre in 1981 (National Park Service 1996.) Information gathered by Gary Ahlstrand (1979) indicates that the average pre-grazing fire cycle (the time between naturally occurring fire events) was about 20 years based on a range of 6 to 34 years in the Lower Montane Coniferous Forest community. Interviews with area residents indicate that no major fires occurred on the Monument during the 20th Century (Gennaro, 1979). Tree-ring analysis of fire-damaged ponderosa pine showed a minimum of five fires in the 19th century (Ahlstrand, 1979).

One of the goals of the fire management program at Capulin Volcano is to achieve ecologically sustainable vegetative conditions by restoring a natural range of variability and bio-diversity. Fire generally restores or regenerates grassland systems. Desired future conditions for the Plains-Mesa grasslands would expand existing acreage and reclaim areas colonized by pinyon-juniper during the last 100+ years. Introducing prescribed fire would allow native grass species to dominate with occasional forbs and shrubs. Frequent fire may prevent the expansion of woodland species into grasslands. This is based on the perception that periodic fires burned these grasslands often enough to kill tree seedlings when they were most susceptible to fire. Sufficient herbaceous ground cover would stabilize soils and carry fire at intervals of less than 20 years. Non-native species cover should steadily decline. Pinyon-juniper woodlands can support stand-replacing fires, although pre-settlement fire regimes were likely a mixture of surface and crown fire with intensities and frequencies dependent on overstory continuity or density. Of 10 fire-scarred pinyon trees collected from 3 locations in New Mexico, multiple fire scars reflected a mean point fire return interval of 27.5 years, with a range from 10 to 49 years (Gottfried et al. 1995.) Other studies in New Mexico report surface fire return intervals of 20 to 30 years and stand-wide fires occurring at 15 to 20-year

intervals. The variation in fire return intervals in pinyon-juniper woodlands is the result of differences in fuel loading and vegetation composition. Where herbaceous vegetation is sparse and unable to carry fire, fire-free intervals are much longer than in areas with a well-developed understory or greater tree density.

B. Research Needed

Implementation of the park's Fire Management Plan should not be contingent on completion of research concerning the fire regime and fire effects on vegetation. A large body of scientific information on the effects of fire and fire exclusion in areas similar to the park already exists. However, more research is needed to understand the desired future conditions for the pinyon-juniper woodland community on the cinder cone. The shallower soils and steep slopes are disposed to woodland species. A diverse shrub and grass/forb understory is desirable to slow soil movement and erosion control. An expanded herbaceous understory and reduced canopy coverage is envisioned, but the extent has not been defined. Additional research is needed to determine fire effects on cultural resource sites with a lava and cinder substrate and effects of geologic structures on fire behavior.

Fire history research in conjunction with the NPS Great Plains CESU and the University of Missouri began in October, 2004. This is a two-year project.

IX. PUBLIC SAFETY

A. Public Safety Issues

Wildland and prescribed fires can be hazardous for firefighters, employees, and visiting public. The safety of all people and developments in the area are the foremost concern of the Incident Commander and/or prescribed fire burn boss.

1. The major visitor use is concentrated along the single road through the Monument that terminates at the crater rim. This road provides access to the visitor center area, picnic area, the crater rim parking lot, and the trails around the rim and into the crater--all places of heavy visitor use.
2. The area is extremely rough due to the volcanic terrain. Steep slopes, jagged basalt surfaces, loose cinders, caves, and deep crevasses in the broken lava are just a few of the hazards.
3. Out of curiosity, some individuals may approach a wildland fire or a prescribed fire and may attempt suppression action.
4. Visitors frequently ignore warnings or are unaware of potential dangers and

wander through burning areas.

5. Visibility on state highways and county roads is of major concern.

B. Procedures for Mitigating Safety Issues

Fires are as individual as the forests or grasslands they burn. Conditions can be hazardous and must be given high priority. Escape routes and safety zones will be identified. In the event of a visitor or staff entrapment on the top of the volcano, the crater rim parking lot has been established as a safety zone. All trails and roads would be closed if there were a park or area fire that could potentially threaten life. In extreme situations the Superintendent may close the park and order evacuations. A fire-qualified Safety Officer will be assigned to all large wildfires and prescribed fires. Visitor and employee safety will take priority over fire suppression and monitoring activities. All key fire management personnel are issued the National Wildfire Coordinating Group Fireline Handbook 410-1. Consistent, accurate monitoring and evaluation of fire behavior in the Monument will provide the basis for developing contingency plans, contacts, and briefings that ensure public and personal safety. Although Monument visitors assume a certain degree of risk and responsibility for their own safety when visiting National Park Service areas, the Monument staff will endeavor to identify recognizable threats to the safety and health of persons and for the protection of property.

The public and park visitors will receive safety and prevention messages issued during the season through contact with Park Rangers, posted warning signs at information centers and on bulletin boards, and news briefs submitted to the media by the Monument. These contacts will serve as an educational source of information to reduce the number of human caused wildfires that occur in the Monument, with the objective of minimizing preventable fires and providing for visitor safety.

The public should be kept out of any fire area and should be far enough away that they will not hinder suppression activities. Any time human life is endangered, all necessary means will be taken to warn or evacuate visitors and private landowners. No one will be permitted near a fire without adequate training and required personal protective equipment.

In the case of a wildland fire that has potential for rapid spread, the safety of park visitors could be threatened. Visitors will be informed about the fire at park access points, roads, and the visitor center. Park visitors and neighbors will be told of any fire activity that may become threatening and will be informed of safety measures.

Temporary closure of part or the entire monument may be necessary when fire could endanger visitor employee safety. When a fire threatens to escape from the park,

adjacent authorities and agencies will be given as much advance notice as possible in order to take action. During extreme situations in which the rate of spread constitutes an immediate threat, all efforts should be made to inform and evacuate all threatened parties as quickly as possible.

The Monument has responsibility for requesting assistance from the State Police Office, District 13, and the Union and Colfax Counties Sheriff's Departments when smoke from wildland or prescribed fires become a danger to motorists. If needed, closures and "Smoke hazard" signs may be placed on the state highway right-of-ways, to insure motorist safety. Appendix I describes specific tasks that will be followed during high and extreme fire conditions.

X. PUBLIC INFORMATION AND EDUCATION

A. Public Fire Information Capabilities and Needs

The National Park Service is committed to informing and educating the public about fire management activities, including fuel treatment plans, wildfire prevention, mitigation and rehabilitation, and fire's role in ecosystem management. The information and education programs address a variety of audiences and increase support for fire management activities. The fire information and education program at Bandelier National Monument serves as a model for the communications program at Capulin Volcano. Objectives would be designed to:

- Provide education on fire management and fire ecology;
- Promote relationships between agencies, community groups, and interested non-governmental partners;
- Provide accurate and timely incident information for local, regional, and national fire operations; and
- Inform local communities, Monument residents and employees, about fire safety, fire prevention, defensible space, and fuels management.

Disseminating information about fire's natural role and effects is an important step in establishing public support for such programs (Stankey 1976, McCool and Stankey 1986). The Monument's wildland fire management information program provides timely, factual, accurate information aimed at a multitude of different audiences. Prescribed fire is a point of emphasis of public information when developing fuels treatment plans. Press releases detailing the "who, what, where, when, why and how" will be distributed to all area public contacts when implementing prescribed fire or hazard fuels related projects.

Fire prevention and fire education programs need to work harmoniously. The Fire

Prevention section of this plan (appendix I) addresses specific preventive actions to take place. These additional guidelines will be followed:

1. The Fire Management Team will keep the Monument's designated Public Information Officer informed daily regarding management actions, the status of active fires, commitment of personnel and resources, etc; for the duration of any wildland fire event.
2. Information handouts will explain the fire management program and be updated as necessary. During periods when management fires are burning, these handouts will be distributed to Monument visitors and general public. Bulletin boards, the Visitor Center, local Chamber of Commerce, and NPS field personnel will all be utilized for distribution.
3. Ecological concepts upon which the wildland fire management program is based will be incorporated into information handouts, selected books written about the Monument, pertinent wayside and visitor center exhibits, appropriate interpretive walks, talks, slide-illustrated and video-taped productions, and other suitable activities in the Monument.
4. During ongoing wildland fires, news articles will be released to local newspapers, radio, and television stations.
5. As with the Fire Prevention Program, close coordination with the neighboring land management agencies and landowners will enable the dissemination of information, particularly when fires are burning in the park.
6. All Monument employees will be made aware of the wildland fire management program and the status of ongoing fires in order to ensure the most effective and accurate responses to visitor questions.
7. Western National Parks and Monuments Association will be asked to assist during ongoing wildland fires, mostly in the form of visitor center coverage and production of informational materials. Sales items that address fire's role in natural areas will be relevant and accurate. These materials will be available to the public at the Monument visitor center.
8. The National Wildland Fire Coordinating Group videos on urban interface and educational programs on the role of fire in the ecosystem best address local monument conditions and audiences.
9. The Monument will develop a media information kit containing detailed information on fire behavior, fire weather, fire ecology, and the Monument's fire

management program.

B. Step-Up Plan Information Actions

The Step-up Staffing Plan for the park is described in Appendix E. Five categories of fire danger, ranging from low to extreme, are identified along with the proper actions to be taken as fire danger escalates. The current rating (low, moderate, high, very high or extreme) will be obtained via local weather monitoring data. Fire danger indices will be publicized when they are high or extreme. Visitors will be made aware of fire restrictions and closures in and around the park. High fire danger notices will be posted at the visitor center. Fire management messages will be introduced into interpretive programs. The park will work in conjunction with neighboring fire departments in fire prevention and education activities in the community. Local media will be informed of fire prevention and education concerns through news releases.

XI. PROTECTION OF SENSITIVE RESOURCES

A. Archeological, Cultural and Historic Sites

Cultural resources are attributed to known occupation of the region, including prehistoric groups from the Paleo-Indian period (such as the Folsom Man Site), Archaic period, Ceramic/Formative Period, and the Protohistoric Period.

At least five archeological sites are documented in areas with fuels capable of sustaining fire. These sites have not been evaluated for National Register significance, but should be treated as such. An comprehensive survey for cultural resources at Capulin Volcano was conducted by Winters in 1985. A 200 acre pre-burn cultural resource survey was performed by Haecker in 1997, which concluded that existing known sites would not be impacted by prescribed fire activities. A level II Cultural Landscape Inventory, completed in 2003, identified several landscape features eligible for National Register listing. These surveys and inventories should be reviewed prior to consultation with NM SHPO.

Although it is unlikely that fire would damage these sites, suppression activities are impacting. Most sites are not recognizable to the average firefighter, field observer or other fire overhead personnel. The potential impact of fire and fire management activities on cultural resources is very important. All recorded sites will be protected during fire operations; and unrecorded sites that are discovered during fire activity will be protected and recorded. Any time the soil is disturbed at the park there is the possibility that an unknown site will be impacted.

Significantly, the greatest damage inflicted on cultural sites is not the result of fire itself but of fire suppression activities. Fire retardants may have a corrosive effect on cultural

materials, although this requires further study. Mechanized equipment activity, hand line construction, helispot clearing, mop-up activity and even rehabilitation can cut deep into the soil, damaging and displacing artifacts. In addition, fire crews, which have not been briefed on the importance of archeological sites, tend to collect surface artifacts.

The impact of fire suppression and rehabilitation activities can be significantly reduced with proper foresight and planning. Minimum impact suppression and rehabilitation guidelines can be found in Reference Manual 18, Chapter 9, Exhibit 5.

A Resource Advisor should be assigned to all Type II and Type I incidents and as needed on Type III incidents. The Superintendent or authorized representative would assign an Archeologist based on:

- Known or suspected site location,
- Complexity of known or potential cultural resources, and/or
- Complexity of the fire organization.

Three major factors determine the extent of fire damage to archeological sites: fire intensity, duration of heat and heat penetration into the soil (Traylor et al., 1979).

The most important variable influencing fire intensity is fuel load. Fire suppression has resulted in higher fuel loads at some areas. The potential for unplanned fire of high intensity poses a threat to cultural resources. The use of low intensity prescribed fires in the park to initially reduce fuel loads is discussed in Reference Manual 18, Chapter V.

Virtually all surface artifacts will be scorched and smoke-blackened by fire. Overall, damage to organic cultural material begins at about 300 degrees C. Inorganic material, which is less vulnerable, can be exposed to temperatures of 400-500 degrees for up to one-half hour without undergoing severe alteration. Specific studies have shown that surface artifacts such as bone becomes charred at 400 degrees C, organic paint burns off of prehistoric pottery at 350 degrees C, and pottery undergoes structural alteration at temperatures exceeding 600 degrees C (Lissoway, 1989). In contrast to surface artifacts, objects buried 5 centimeters or more below ground are generally unaffected by fire. An exception would be objects buried in proximity to burning roots, which can reach temperatures as high as 1500 degrees C (Traylor et al., 1979).

The indirect effects of fire can also impact archeological sites. Loss of vegetative cover can lead to severe erosion and uprooting of trees killed by the fire that can fracture or displace artifacts.

A beneficial by-product of fire can be the removal of dense vegetation, which hinders the detection of unrecorded archeological sites.

Consultation with the New Mexico State Historic Preservation Office (NM SHPO) prior to implementation of planned projects is required for compliance with Section 106 of the National Historic Preservation Act. The NM SHPO requests a minimum of 30-days lead time to review specific projects in the five-year treatment plan. To evaluate the potential effect of fire management activities, the NM SHPO needs information on: cultural resources inventory, identification, evaluation, and possible treatment or mitigation. Examples of consultation letters are provided in the appendix.

B. Natural Resources

In 1998, Capulin Volcano National Monument: Listed and Category Species Inventory was completed and documented no species in the park in these categories. In 2003, National Park Service Southern Plains Network Final Inventory Report for New Mexico Parks was completed by the Natural Heritage Group, University of New Mexico. This inventory of reptiles, amphibians, birds, mammals and plants was completed by the Natural Heritage Group, University of New Mexico

In the event that sensitive, threatened or endangered species are found within Monument boundaries, the staff will contact the U.S. Fish and Wildlife Service. If an emergency event, such as a wildland fire, is determined to be in proximity to listed species or critical habitat the NPS will make initial contact with USFWS by telephone. However, the NPS should not delay emergency response for this contact. The NPS will initiate formal consultation after the emergency event is under control, if listed species or critical habitat has been adversely affected.

During fire suppression activity, the USFWS recommends implementing measures to reduce adverse effects to wildlife and habitat, including:

1. Inform all fire personnel about listed species, and the importance of protecting habitat and minimizing take.
2. Designate resource advisors to coordinate natural resource concerns and identify protective measures endorsed by the Incident Commander.
3. Locate crew camps and staging areas in areas that are previously disturbed.
4. Evaluate effectiveness of suppression activities and measures to minimize impacts to wildlife and habitat after a fire.
5. Monitor effectiveness of burned area emergency rehabilitation (BAER) activities.

C. Infrastructure and Developments

Accepted interagency urban interface wildland fire risk mitigation techniques should be applied to prevent or reduce negative impacts to identified values at risk. These techniques may include, but are not limited to, hazard fuels removal, improvement of fire

engine accessibility, and removal or replacement of burnable materials on or near structures. Reducing hazardous fuels and herbicide application around Mission 66 period buildings and landscape features would not affect their potential eligibility for National Register listing.

D. Resource Impact Mitigation Measures

Soils

- Actions designed to re-cover fire lines and other bare mineral soils to prevent erosion would be identified in a rehabilitation plan.
- Planning would involve prescriptions where low-intensity, short-duration fire is desirable.
- The burn plan would include locating control lines that ensure minimum soil exposure, and would ensure that the organic layer would remain following burning.
- Pile burns would be avoided in locations where soils may be vulnerable to sterilization.
- Removal of trees thinned from slopes of the cinder cone would be done in a manner to minimize surface disturbance. It may be desirable to burn slash piles on the volcano rather than increase disturbance by dragging material down the steep loose slopes.
- Ground disturbance, especially on the steep volcanic slopes, would be minimized wherever possible.
- Soil moisture should be high enough to ensure that an organic layer would remain following burning.
- Targeted areas for herbicide treatment would be less than 2 acres each.

Vegetation & Wildlife

- Utilize minimum-impact suppression tactics (National Park Service 2003) on all incidents.
- Consult with natural resource specialists on proposed locations of management actions that may remove or disturb native vegetation/habitat.
- Consult with natural resource specialists on proposed locations of management actions that may disturb habitats for the Pale Townsend's Big-eared bat (*Plecotus townsendii pallescens*) and Capulin Alberta butterfly (*Oeneis alberta capulinensis*).
- Consider known effects of fire and non-fire treatment on limited/sensitive species habitat in mitigation planning.
- The application of herbicides would follow NPS Integrated Pest Management (IPM) guidelines which require employee training, application under specific manufacturer's direction, and follow-up monitoring of effects.

- Consult with a vegetation management specialist to consider the effects of fire on existing weed species or potential for weed introductions.
- Before any native ecosystems are disturbed (as with prescribed burning), identify the exotic species likely to invade the disturbed areas.
- Determine measures to minimize disturbance and contain the spread of invasive species.

Air Quality

- Reduce fuels available for combustion by removal and use of head-fire ignition with the wind wherever practical.
- Burn at higher fuel moisture of the large fuels (i.e., logs, branches); combine this technique with burning at lower fine fuel moisture (i.e., needles, leaves, grasses.)
- Use mop-up actions on larger fuels to reduce duration of smoke impacts.
- Reduce particulate emissions for the fuel consumed by reducing the time period of the smoldering phase; encourage flaming combustion to the extent possible.
- Avoid smoke-sensitive areas, such as highways during heavier traffic periods (i.e., weekends, holidays.)
- Avoid burning near smoke-sensitive areas when there are strong inversions or very stable high-pressure systems are in place.

Cultural Resources

To mitigate potential cultural resource damage, personnel will be trained to identify the most common types of sites, which include: lithic scatters, ring structures, and dwellings such as caves and rock shelters. On lava flows with thinner soils, suppression tactics that minimize ground disturbance will rely on the use of water and the enhancement of natural fuel breaks. Using trained personnel and low impact suppression tactics lowers the risk of damage to cultural sites.

- Use minimum-impact management tactics on all incidents and project work.
- Locate, identify, and isolate sites that are vulnerable to fire effects or human activities.
- Remove fuels that cause long-duration heating, particularly in areas of heavy down/dead fuels.
- Educate fire crews about the need to protect cultural resources.
- Use other on-site measures to protect cultural sites and features as necessary.
- Avoid prescribed fires near cultural and other sensitive resources unless adequate planning and mitigation has assured their protection.
- Use water as much as possible rather than construction of hand line to contain unplanned wildland fires to minimize the potential of disturbing archeological sites.
- Consider including black-lining around structures or features near wildland fires, treating structures with fire retardant foam, wrapping structures with heat reflective materials, and establishing sprinkler systems on and around structures concurrent with wildland fire suppression activities.
- Use retardants approved by the U.S. Forest Service and Bureau of Land

- Management only as authorized by the Superintendent or designee.
- Use off-road motorized equipment such as all-terrain vehicles and wildland fire engines only as authorized by the Superintendent or designated representative.
 - Designate a resource advisor to assist suppression operations; if qualified employees are not available, a Resource Advisor would be ordered through the interagency dispatch system.
 - Continue consultations with American Indians to protect resources valued by the tribes.
 - In the event that cultural resources are discovered during suppression or treatment activities, work would be halted in the vicinity of the resource, and procedures outlined in 36 CFR 800 would be followed.

Health & Safety

- Mitigation for Alternative A would apply, along with;
- Temporary signs posted at herbicide application sites and in the Visitor Center.

Cooperative Relationships

- Maintaining communications with area residents is an important mitigating factor in fire management planning and operations. Newsletters, press releases, meetings, and interpretive messages would be designed to keep neighbors informed and involved.

XII. FIRE CRITIQUES AND ANNUAL PLAN REVIEW

A. Critiques

Fire critiques and evaluations at Capulin Volcano National Monument for post-prescribed fire projects will provide a thorough review of any deficiencies which require improvement or correction. The purpose of this critique or review is to recognize and document actions that were successful, and to identify and rectify actions that were unsafe or ineffective.

All fires in the park will be reviewed by those involved. Topics to evaluate include: the initial response; "hotline" (on-going fire incident) review; control methods used; safety concerns; and the need for new or replacement equipment. The Incident Commander, Prescribed Fire Burn Boss, Fire Management Officer (or the official who has designated fire program responsibilities) will conduct this review.

The Superintendent will conduct closeout meetings with incident management teams to ensure a successful transition of incident command back to the park staff, and to identify and evaluate incomplete fire business. Refer to Reference Manual 18, Chapter 13, Exhibit 1, for a sample incident management team closeout.

A regional or national level fire review may be conducted if the fire:

- Crossed the park boundary into another jurisdiction without the approval of landowner or agency;
- Resulted in adverse media attention;
- Involved serious injury or death, significant property damage, or had the potential to do so; and,
- Resulted in controversy involving another agency or landowner.

Refer to Reference Manual 18, Chapter 13, Exhibits 2 & 3, for critique format and questions.

Program reviews, operations evaluations, and/or FIREPRO reviews are conducted as soon as possible to ensure compliance and accountability with established standards and procedures.

All entrapments and fire shelter deployments will be reported and investigated as soon as possible after the incident. Refer to Reference Manual 18, Chapter 13, Exhibit 4 & 5, for review directions and a written outline format.

B. Plan Reviews

An informal review of the fire management program will be conducted annually to evaluate procedures and identify needed changes to the FMP. A formal fire management review will occur every 5 years. The Superintendent approves significant changes to the body of this plan. The only exceptions to this procedure will include: grammatical corrections, minor procedural changes, deletions, corrections, and additions to the Appendixes. Copies of all changes will be forwarded to Lake Meredith NRA and the Intermountain Region Fire Management Office. Changes requiring approval and concurrence will be submitted with a replacement cover sheet for signature.

XII. CONSULTATION AND COORDINATION

A. Agencies Consulted:

Federal:

USDA, Kiowa National Grassland
USDA, Natural Resource Conservation
Service
Taos Zone Interagency Dispatch
NPS, Bandelier National Monument
NPS, Intermountain Regional Office

Tribal Governments:

All-Indian Pueblo Council

New Mexico State Agencies:

State Historic Preservation Office
Department of Game and Fish
Environment Department-Air Quality
Energy, Minerals, & Natural Resources
Department-Forestry Division
State Land Office

Local Agencies:

Union County, NM Commissioners

Apache Tribe of Oklahoma
Cheyenne-Arapaho Business Committee
Commanche Tribe of Oklahoma
Eight Northern Indian Pueblo Council
Jicarilla Apache Nation
Mescalero Apache Tribe
Southern Ute Tribe
Taos Pueblo Tribal Government
Ute Mountain Ute Tribe
Wichita and Affiliated Tribes

Union County Soil Conservation District
Colfax County, NM Commissioners

Organizations:

Jicarilla Apache Cultural Center
Northeast New Mexico BioMass, Ltd.
Carson Forest Watch
Des Moines Volunteer Fire Department
Folsom Volunteer Fire Department
Capulin Volunteer Fire Department

B. Persons Consulted:

Margaret Johnston, Superintendent, Capulin Volcano National Monument
Brian Quigley, Chief Ranger, Capulin Volcano National Monument
Doug Enders, Chief of Maintenance, Capulin Volcano National Monument
Bruce Robinson, Biological Technician, Capulin Volcano National Monument
Dana Bishop, Resource Assistant, Capulin Volcano National Monument
Mike Davin, Fire Management Officer, Lake Meredith National Recreation Area
Joshua Erickson, Prescribed Fire Technician, Lake Meredith National Recreation Area
Stephen Fisher, Geographical Information Specialist, Lake Meredith National Recreation Area
Eva Long, Compliance Specialist, Intermountain Regional Office-Denver, Colorado
Lisa Hanson, Compliance Specialist, Intermountain Regional Office-Denver, Colorado
Cathy Spude, Archeologist, Intermountain Regional Office-Sante Fe, New Mexico
John Lissoway, Wildland Fire Associates, Los Alamos, New Mexico

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APPENDIX B: DEFINITIONS

Appropriate Management Response - Specific actions taken in response to a wildland fire to implement protection and fire use objectives. This term is a new term that does not replace any previously used term.

Behave Plus- A system of interactive computer programs for modeling fuels and fire behavior.

Burning Period - A 24 hour period beginning at 10:00 a.m. and ending at 10 a.m. the following day.

Chain - Unit of measure used in land survey equal to 66 feet. Commonly used to report fire perimeters and rates of spread

Ecosystem - An interacting system of interdependent organisms and the physical set of conditions upon which they are dependent and by which they are influenced.

Fire Management Unit - A distinct part of park that can be recognized and mapped from its external features.

Fire Dependent or Fire Maintained Ecosystem - An ecosystem in which periodic fire is essential to the functioning of the system.

Fire Management Plan - A strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land use plan. The plan is supplemented by operational plans such as preparedness plans, preplanned dispatch plans, prescribed fire plans and prevention plans.

Fire Monitoring - The act of observing a fire to obtain information about its environment, behavior, and effects in order to evaluate the fire and its prescription.

Fire Weather - Weather conditions that influence fire ignition, behavior and suppression.

Fuel Loading - Amount of dead & live fuel present on a particular site at a given time.

Fuel Model - A simulated fuel complex containing fuel descriptors to estimate rate of spread of fire.

Holding Actions - Planned actions required to achieve wildland and prescribed fire management objectives. These actions have specific implementation timeframes for fire use actions but can have less sensitive implementation demands for suppression actions. For prescribed fires, these actions are developed to restrict the fire inside the planned burn unit. For suppression actions, holding actions may be implemented to prohibit the fire from crossing containment boundaries.

These actions may be implemented as firelines are established to limit the spread of fire.

Ignition Specialist -A person trained and experienced in ignition methods and equipment.

Initial Attack - Action taken by the first resources to arrive at a wildland fire to meet protection and fire use objectives.

Mixing Height - Height a column of smoke will rise in the atmosphere.

Mop Up - Extinguishing or removing burning material near control lines to make the area safe or to reduce residual smoke.

National Fire Danger Rating System - A system of models that estimate the fire danger for various fuel models throughout the United States.

Normal Fire Year - The normal fire year for suppressed wildland fires is the year with the third highest number of wildland fires in the past ten years of record. The normal wildland fire managed for resource benefits year is the year with the third highest number of acres burned by wildland fire managed for resource benefits in the past ten years of record.

Planned Ignition - A wildland fire ignited by management actions to meet specific objectives.

Preparedness - Activities that help to provide a safe, efficient and cost effective fire management program in support of land and resource management objectives through appropriate planning and coordination.

Prescribed Fire - Skillful application of fire to natural fuels under conditions of weather, fuel moisture, soil moisture, etc., that will allow confinement of the fire to a predetermined area and at the same time will produce the intensity of heat and rate of spread required to accomplish certain objectives of wildlife management and hazard fuel reduction.

Prescribed Fire Plan - a plan required for each fire application ignited by managers. It must be prepared by qualified personnel and approved by the appropriate Agency Administrator prior to implementation. Each plan will follow specific agency direction and must include critical elements described in agency manuals. Formats for plan development vary among agencies, although content is the same.

Prescription - Measurable criteria, which define conditions under which a prescribed fire may be ignited, guide selection of appropriate management responses, and indicate other required actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social or legal considerations.

Rate of Spread - The relative activity of a fire extending its horizontal dimensions, expressed as

rate of increase in perimeter, rate of increase in area, or rate of advance of its flaming front. Generally expressed in chains per hour.

Suppression - A management action intended to protect identified values from a going fire, extinguish a fire, or alter a fire's direction of spread.

Unplanned Ignition - A wildland fire not ignited by management actions.

Wildland Fire - A free-burning fire; all fire other than prescribed fire that occurs on wildland vegetations.

Wildland Fire Management - All activities related to the prevention, preparedness and suppression of fire burning through vegetation.

Wildland Fire Situation Analysis - A decision-making process that evaluates alternative management strategies against selected environmental, social, political, and economic factors.
Wildland Fire - Any non-structure fire, other than prescribed fire, that occurs in the wildland. This term encompasses fires previously called both wildfires and prescribed natural fires.

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

APPENDIX C: SPECIES LISTS

(Will be inserted)

APPENDIX D: NEPA AND NHPA COMPLIANCE

2004 Fire Environmental Assessment Here

APPENDIX E: ANNUAL SUPPLEMENTAL INFORMATION

1. Step-Up Plan

STAFFING CLASS	BI	FIRE DANGER
I	0-8	Low
II	9-18	Moderate
III	19-37	High
IV	38-40	Very High
V	41+	Extreme

Management Actions

Low, Initial attack by park staff working normal tours of duty.
 SC-1
 BI, 0-8

- Fire weather reviewed daily;
- Hand tools and Slip-on pumper and truck are fire ready and available for park assignments.
- Initial attack may be conducted by Folsom VFD, Capulin VFD and/or Des Moines VFD, if park has no qualified firefighters available. The park will provide an agency representative in these cases; and,
- Additional attack forces will be dispatched after size-up and upon request of the first firefighter to arrive.

Moderate, Minimum of 2 initial attack personnel available during normal tours of duty.
 SC - II
 BI, 9-18

- All actions specified for staffing Class I days will be implemented at this level.

High, Minimum of 2 initial attack personnel available during normal tours of duty.
 SC - III
 BI, 19-37

- All actions specified for staffing Class I and II days will also be implemented at this level.
- Slip-on pumper is fire ready and available for assignments within the mutual aid area. A second engine will be requested to be on call from outside the Monument.

- Increased patrols will be made after dry lightning activity in the initial attack area.

Very High

SC -IV
BI, 38-40 Minimum of 2 initial attack personnel and one I.C. IV or V and/or Agency Representative available.

- All actions specified for staffing Class I, II, and III days will also be implemented at this level.
- Firefighters may work extended hours and lieu days with supervisory approval and emergency firefighters hired on an administratively determined basis;
- Emergency restrictions and/or closures may be established by the Superintendent. When possible, restrictions will be coordinated with adjacent land management agencies and landowners.
- Visitor center personnel will alert the public to fire conditions and hazards fire danger notices will be posted; and,
- Interpretive activities will include a fire safety message;

Extreme

SC - V
BI, 41+
Red Flag Alert One Type IV I.C. and/or Agency Representative- Type IV will be available or within a two hour response time.

- All actions specified for staffing Class I, II, and III days will also be implemented at this level.
- The Chief Ranger may cancel lieu days and annual leave for fire personnel.
- Pumper and recruited engine will be available for in-park assignments.
- Severity requests will be completed in coordination with Lake Meredith NRA.
- Request additional resources through the Forest Service and/or Lake Meredith National Recreation Area (NRA);

2. Fire Call-Up List
November 5, 2004

Emergency Numbers for Reporting Fires

Folsom Fire Department	505-278-2494
Capulin Fire Department	505-278-2278
Des Moines Fire Department	505-278-3470
New Mexico State Forestry	505-376-2204
Kiowa/Rita Blanca National Grasslands	505-374-9652

Park Personnel Call-Up List for Fire Notification

Maggie Johnston	505-278-2201 ext.210 (home)
Brian Quigley	505-278-2201 ext.230 (home)
	505-278-2201 ext.240 (home)
Jill Morrow	505-278-2201 ext.220 (home)

Zone and Cluster Numbers

Mike Davin, LAMR-FMO	806-865-3360 ext. 26 806-857-0024 (home) 806-674-0608 (cell)
Tambre Lumpkin, LAMR-FPMA	806-865-3360 ext.24 806-273-3854 (home) 806-886-2291 (cell)
Bryan Swift, IMR-FMO	303-969-2449 303-989-2075 (home) 303-475-5214 (cell)
Christine Peters, IMR-FPMA	303-969-2948
Taos Zone Coordination Center	505-758-6208 505-758-6207 (fax)

3. Preparedness Cache Inventory

Inventory Date: 14 October 19, 2004
Jenkins

Conducted by: VIP Karl

FIRE CACHE INVENTORY

- 5 Back pack water units, with hose
- 7 McClouds
- 5 Scrapers
- 5 Flappers
- 8 Pulaskis
- 2 Brush hooks
- 2 Loping shears
- 9 Safety helmets - 6 red, 3 yellow
- 4 Shovels, spade type
- 2 Wildfire vests - Medium
- 5 Respirators - Particulate
- 11 pair Gloves - Wildfire protective
 - 5 - X Small
 - 2 - Small
 - 4 - X Large
- 20 pair Trousers - green and/or brown
 - 5 - size, waist 28 - inseam 30
 - 9 - size, waist 32 - inseam 36
 - 2 - waist size 34
 - 2 - size, waist 34 - inseam 38
 - 1 - waist size 38
 - 1 - waist size 40
 - Trousers with suspenders - size, waist 35 - inseam 34
 - Jacket, Small
- 3 Fire Shelters
- 6 Packs - personal gear - red
- 15 Shirts - Fire Retardant - yellow
 - 2 - Small
 - 8 - Medium
 - 3 - Large
 - 2 - X Large
- 10 Stuff sacks
- 12 Headlamps, Fire Fighter
- 9 Goggles

- 63 Surveyor ribbon rolls - Flagging
 - 21 - Orange
 - 10 - Blue
 - 12 - Red
 - 12 - Pink
 - 6 - Yellow

- 11 Hoses, 1" diameter, white (about 20' long)
- 16 Canteens, plastic, in canvas carrying case
- 6 Canteens, metal, with carrying strap
- 1 Weather Kit, complete in carrying case
- 1 Fireline Handbook
- 3 Training vests (45# weights)
- 2 Practice fire shelters
- 5 Field Packs, Fire Fighter
- 6 packs, Metal wedges, each containing 12 wedges
- 6 Wetting Agent, concentrate, 1/2 gallon each
- 1 Wind speed indicator
- 3 pkgs. Fuel moisture sticks
- 2 Belts, equipment
- 100 Fire Equipment Inspection Records
- 6 Knapsacks, green
- 5 miscellaneous Nozzels, brass for hose
- miscellaneous Brass Fillings for hose
- 134 Canteens, plastic (in 2 boxes on top side of lockers)
 - 1 Hose, 1" diameter, about 100'
 - 3 Hoses, 1 1/2" diameter, about 100' each
 - 1 Hose, 1 1/2" diameter. About 50'

4. Prescribe Fire Prescription

	<i>Fuel Model 1&2</i>	<i>Fuel Model 6</i>
1-hr fuel moisture	3-9%	2-9%
10-hr fuel moisture	4-10%	4-10%
20' wind	1-18 mph	1-15 mph
Live Fuel Moisture	N/A	30-300%

Note: Fuel Model 6 will require a head fire to be effective. Given the unique geography of the park, holding problems are minimized and head fires are a preferred alternative.

5. Cooperative Agreements

(Agreement will be inserted)

APPENDIX F: MONITORING PLAN

A. PURPOSE AND OBJECTIVES

The purpose of these guidelines is to provide Park Fire and Resource Management personnel with procedures and protocol to plan, establish, collect and maintain data, and evaluate any type of weather, fire behavior, fire effects, and other information necessary to achieve stated objectives.

Objectives:

1. To assess short and long-term fire effects from prescribed and wildfire; and to minimize adverse impacts from same;
2. To ensure the scientifically accurate collection, evaluation and maintenance of data relating to fire's role on Capulin Volcano's landscape;
3. To utilize monitoring data in assisting with the development and/or revision of park resource and fire management goals and objectives, prescription refinement or development, escaped fire situation analysis, and related management needs.
4. To expand park knowledge of fire ecology and fire effects.

B. MONITORING LEVELS

All levels will include (a) Qualitative (b) Quantitative and (c) Photographic descriptions of the treatment area. The following levels are in ascending order of complexity, and will be employed as required by the situation:

LEVEL 1 - General Reconnaissance For Any Fire Event

- a. Fire location, size, and cause
- b. Fuel/Vegetation type
- c. Level of fire activity (smoldering, creeping, running, torching, crowning, etc.)
- d. Spread potential (consider fuel breaks, etc.)
- e. Current/Forecasted weather
- f. Threats/Constraints to safety, resources
- g. Smoke volume and movement

LEVEL 2 - Pre-burn Monitoring (management ignited prescribed fires)

- a. For all fires (*list on fire plan and objectives);
 - On-site Environmental conditions: Drybulb (F), RH (%), Wind Speed/Dir at level specified, Shading (%), 10-hr TLFM (%), Live FM (%), Days since precipitation
 - Overstory type (Dominant)
 - midstory type (Dominant)
 - Understory type (Dominant and Co-Dominant species)
 - Ground fuels/Duff type and avg. depth of each
 - Slope %
 - Aspect of terrain
 - Fuel loading (Tons/Acre), total dead & down (Pre/Post fire)
 - Photography; 35 mm (Pre/Post fire); describe photo points
- b. For long term monitoring (*indicate and list on fire plan);
 - Establish long term plot (standards established by Monument resource management personnel; specify time interval
 - All variables listed in a) above, plus: tree density by species, diameter by species, fuel load by size/class, % cover of shrubs, herbs, graminoids.
 - Cultural features: site #, type and general condition of surficial materials, other qualitative data determined by Southwest Region Archaeologist.

LEVEL 3 - Post-fire Monitoring

- a. Other than long term:
 - Assess objectives accomplishment quantitatively: fuel reduction percentage(s), canopy reduction percentage, other; photos at established photo points.
- b. Long term (at specified time interval):
 - Read plot according to pre-fire standards.
 - Follow up assessment of variables & features listed, Level 2.

APPENDIX G: PRE-ATTACK PLAN

INITIAL ATTACK PROCEDURES

This order provides guidance for the initial attack of wildland fires. There are exceptions and special situations, however; these procedures provide a general framework for initial attack decisions and actions.

References: NPS-18 Fire Management Guideline
Fireline Handbook NWCG Handbook 3
Taos Zone Operating Procedures
CAVO Fire Management Plan

NOTIFICATIONS

1. Upon receiving a smoke report, determine if the fire is within our boundary.
2. Towns of Folsom, Capulin, and Des Moines will be notified in case of additional resource needs.
3. Taos Zone Dispatch Center (TNZ Zone) will be promptly informed of all fires, unless already notified by a lookout or other responsible official. The fire Incident Commander (IC) will keep TAOS Zone informed about suppression actions.
4. A National Park Service (NPS) fully qualified Incident Commander-Single Resource or higher will be requested to manage the fire unless another agency IC has been designated.
5. The Chief Ranger will be promptly notified of all fires that occur in the Monument and will be responsible for ensuring post fire reports are completed (i.e. 1202's).
6. Southern Plains Cluster FMO will be notified of all wildfires within the Monument boundary.

RESPONSE

1. First response will be by red-carded employee(s) nearest to the reported fire. This unit is responsible for the initial assessment and size-up
2. The fire crew should be promptly dispatched (usually in the slip-on pumper unit).

SIZE-UP

The first responding unit and/or the fire crew are responsible for an accurate fire size-up. This information will be promptly relayed to the IC so that decisions can be based on current information.

FIRE SIZE-UP CHECKLIST

1. Directions to Fire Location(s): Give precise directions to the fire locations. This may include road route numbers, mileage from one intersection to the next, trail names, compass bearings, etc.
2. Quick Estimate of Fires Location: A best estimate that you can obtain quickly relative to a prominent land mark, road or other know location, i.e.,; one-half mile south of the crater rim
3. Values at Risk: Presence of structures, facilities, residences and other developments in the fire vicinity.
4. Brief Weather Description: Estimate wind speed (average and gusts), wind direction, presence of cumulus clouds/thunder storms.
5. Description of Terrain: Slope steepness, aspect, canyons or other drainage patterns.
6. Description of Fuels:
 - Comprised primarily of grass, Brush or Timber (Fuel Model if known)
 - Light, Medium, or Heavy Down and Dead Fuels
 - Light, Medium, or Heavy Reproduction of other Ladder Fuels
 - Open, Medium or Closed Canopy
7. Description of Fire Behavior: (At the head of the fire if safe to gather data): Smoldering, creeping, running, torching, crowning and/or spotting (including spotting distance).
8. Average Flame Length: Measured in feet at the head of the fire if safe to do so. Be sure to get the average and not to overestimate due to an occasional tree torching out.
9. Rate of Speed: Measured in chains per hour (1 Chain = 66 feet) at the fire head, if safe to do so. Remember that the fire spread in feet per minute is roughly equal to chains per hour.
10. Approximate Fire Size: Expressed in acres. Try to mentally compare the fire size to an area of known acreage.

11. Types and Numbers of Additional Resources: Your estimate of resources needed to manage the fire.

Size-up should include the following information:

- Directions to fire locations
 - Quick estimate of fire location
 - Values/structures threatened ahead of the fire
 - Description of weather
 - Description of terrain in fire vicinity
 - Description of fuels in the fire vicinity
 - Description of fire behavior (creeping, running, etc.)
 - Average flame length
 - Rate of spread
 - Approximate fire size in acres
 - Estimate of types and numbers of resources needed
12. After the above information is relayed, the specific location of the fire should be determined including the legal description and responsible fire agency. This information needs to be relayed to monument headquarters, TAOS Zone (via the Dispatcher, if available), and the Southern Plains Cluster FMO office.

RESOURCE ORDERING

1. Within park, resources will be ordered through the Monument's Chief Ranger or qualified Incident Commander, if on-scene. All other resources will be ordered through the TAOS Zone (via dispatcher, if available).
2. The number and types of resources requested will be based upon the following considerations:
 - What resources are actually available and what are the response times for the available resources?
 - What resources would manage this fire in the safest possible manner?
 - What fire resources would manage this fire with the least amount of short and long term environmental damage? This should take into consideration wilderness concerns, policies and procedures of the land management agency, delegations of authority and other applicable directives.
 - What resources would be most efficient in terms of cost and time?

FIRE SUPPRESSION

1. Whenever an Incident Commander from a cooperating agency manages a fire within the park's boundaries, the Superintendent must provide a written limited delegation of authority and a briefing package.
2. The federal fire policy allows managers to select the most appropriate suppression strategy. Firefighter safety should be the primary consideration when selecting the most appropriate strategy. Values at risk, probability of success, consequences of failure, cost and management objectives and public and adjacent landowner concerns are some additional considerations in selecting the most appropriate strategy. The preferred strategy should be implemented as quickly, safely and efficiently as possible.
3. When confinement is determined to be the most appropriate strategy, it may *not* be used to meet resource objectives. If a wildland fire exits or threatens to leave the park, or if initial attack objectives are not met after 24 hours, the fire must be considered to be in extended attack and a new strategy must be selected in accordance with the Interagency Wildland and Prescribed Fire Implementation Guide. The fire would have to be managed in cooperation with other jurisdictions because of the size, location of the park and the predominant fuel type. The park is surrounded by private and state land, so coordination with private land owners and state is critical. The following information should be used in determining management actions and decisions:
 - Threats to life, property and park resources;
 - Availability of suppression forces;
 - Current and expected fire behavior; and,
 - Wildland Fire Situation Analysis
4. Fire management activities in the park will be conducted in such a way as to cause the least amount of impact to the resources. The use of minimum impact suppression will be stressed to all suppression forces working within the park. The Wildland Fire Situation Analysis and Delegation of Authority are the key elements to insure that minimum impact suppression occurs. Critical natural and cultural resource protection issues will be identified in all WFSAs. Delegations of Authority will contain specific minimum impact suppression requirements. Incident management teams will be informed that their compliance with resource protection and minimum impact suppression requirements will be a primary component of the team's evaluation using sound suppression strategies and tactics.

APPENDIX H:

LONG-TERM PRESCRIBED FIRE AND HAZARD FUEL REDUCTION PLAN November 2004

Prepared by: Michael Davin

Multi-year Prescribed Fire Schedule and Hazard Fuels Reduction Areas & Schedule

State	Region	WUI or HF	Fiscal Year	Project Name	Activity Type	Treat Type	NEPA	Target Acres	Notes
NM	IMR	WUI	FY05	Grassland Restoration RX	Treatment	Fire	Within FMP NEPA	50	On the flats
NM	IMR	WUI	FY05	Volcano Slopes Thinning	Treatment	Mechanical	Within FMP NEPA	20	On the volcano
NM	IMR	WUI	FY06	Grassland Restoration RX	Treatment	Fire	Within FMP NEPA	100	On the flats
NM	IMR	WUI	FY06	Volcano Slopes Thinning	Treatment	Mechanical	Within FMP NEPA	80	On the volcano
NM	IMR	WUI	FY07	Grassland Restoration RX	Treatment	Fire	Within FMP NEPA	100	On the flats
NM	IMR	WUI	FY07	Volcano Slopes Thinning	Treatment	Mechanical	Within FMP NEPA	100	On the volcano
NM	IMR	WUI	FY08	Grassland Restoration RX	Treatment	Fire	Within FMP NEPA	100	On the flats
NM	IMR	WUI	FY08	Volcano Slopes Thinning	Treatment	Mechanical	Within FMP NEPA	300	On the volcano
NM	IMR	WUI	FY09	Volcano Crater RX	Treatment	Fire	Within FMP NEPA	25	On the volcano
NM	IMR	WUI	FY10	Volcano Slopes RX	Treatment	Fire	Within FMP NEPA	100	Volcano slopes continue to be burned at approx.
									100 acres per year from FY10 on until the entire volcano is treated; after that the entire park will have received initial treatment; maintenance burns will occur of 50-100 acres per year, depending on factors such as drought, condition assessment, and fuel reduction needs, as determined by ecological/monitoring

									staff and park management
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APPENDIX I: FIRE PREVENTION PLAN

Capulin Volcano National Monument is embarking on a new fire management direction. For purposes of fire prevention analysis, proposed developments were included if they are likely to be in place during the life of this Fire Management Plan.

ACTIONS FOR PARKWIDE IMPLEMENTATION

1. Appropriate fire safety signs will be posted on park bulletin boards, entrance signs and the visitor center.
Responsible Persons: Interpretive Specialist
2. Fire prevention messages will be included in park publications such as site bulletins and other handouts.
Responsible Person: Interpretive Specialist
3. Appropriate fire safety messages will be included in all interpretive programs. When possible, programs at local schools will emphasize fire's natural role in the ecosystem and the prevention of human caused wildfires.
Responsible Persons: Interpretive Specialist
4. During extended periods of very high to extreme fire danger, press releases will be prepared. When possible, press releases will be coordinated with adjacent land management agencies and landowners.
Responsible Person: Chief Ranger
5. All park employees will complete the Introduction to Wildfire Prevention training course.
Responsible Person: Chief Ranger
6. During the fire season, the daily fire danger rating (Staffing Class) and any Red Flag Alerts will be announced to all staff on duty.
Responsible Person: Chief Ranger
7. Prevention patrols will be conducted to contact visitors regarding fire safety and to insure compliance with restrictions and regulations.
Responsible Person: Chief Ranger

8. During very high to extreme fire danger, emergency restrictions and/or closures may be established by the Superintendent. When possible, these restrictions will be coordinated with adjacent land management agencies.

Responsible Persons: Superintendent

9. Annual fire safety inspections will be conducted at all government owned structures and facilities within the park.

Responsible Person: Facility Manager

Zone 1 Monument-wide

RISK

HIGH The visitor center, picnic area, crater rim road, parking area, hiking trails, and interpretive displays receive heavy visitor use.

HAZARD

HIGH Open and closed Pinyon-Juniper woodland with fairly continuous fine fuels of grass, short grass prairie, lower montane coniferous forest, and montane scrub. All fires have been suppressed in the area since designation as a Monument in 1916. No major fires have occurred during this time. All grazing in the Monument was terminated by 1978. As a result of these factors, a profuse growth of brush has developed and ground fuel loading has built up.

VALUE

HIGH The visitor center, picnic area, crater rim road, parking area, hiking trails, employee residences, maintenance buildings, administrative offices, benches and signs, and interpretive displays are facilities in the Monument. Also the Monument is surrounded by privately owned and state leased land that needs to be protected.

Specific Prevention Actions

1. Contact private landowners/operators and discuss fire prevention/safety.
Responsible Person: Chief Ranger
2. Display a fire danger indicator at the visitor center.
Responsible Person: Chief Ranger
3. Conduct prescribed fires and/or mechanical thinning to manage fuel loads.
Responsible Person: Chief Ranger with Area FMO

Version A.

Date: November 22005

Prepared by: Michael Davin

APPENDIX J: RENTAL EQUIPMENT AGREEMENTS

(To be inserted if rental equipment agreements are established)

**APPENDIX K:
CONTRACTS FOR SUPPRESSION AND PRESCRIBED FIRE RESOURCES**

(To be developed at a later date)

APPENDIX L

BURNED AREA EMERGENCY STABILIZATION AND REHABILITATION PLAN

REHABILITATION PLAN

Because fire is a vital process that shapes the ecosystem, the effects of fire are generally considered natural and accepted as part of the process. However, fires and suppression activities can result in disturbance that requires mitigation. The most effective rehabilitation measure is careful planning and skilled implementation of minimum impact suppression techniques.

For initial attack fires, rehabilitation needs should be limited and will be determined and implemented by the Incident Commander and Chief Ranger. For larger fires with incident management teams, rehabilitation requirements may be more substantial. A rehabilitation plan will be prepared by the team in conjunction with the Resource Advisor and Agency Representative for approval by the Superintendent. The plan will be submitted in a timely manner so that rehabilitation work can be completed by resources already assigned to the fire.

The overriding philosophy for rehabilitation is that the minimum treatment necessary for the stabilization of the burn and other impacted areas be used. Specific rehabilitation standards will be identified in individual rehabilitation plans and follow the Interagency Burned Area Emergency Stabilization and Rehabilitation Handbook.

General guidelines for rehabilitation include:

- Water bars will be installed on firelines where necessary to prevent erosion.
- Brush and other existing organic material will be moved back onto firelines.
- All stumps except oaks will be flush cut.
- All signs of human activity will be removed (litter, flagging, etc).
- Campsites, helispots and other locations will be restored to natural conditions as much as possible.
- Burned areas may or may not be seeded. Most conditions allow residual seeding, and sprouting from surviving root stalks provides natural regeneration.