

Devils Postpile National Monument

National Park Service
U.S. Department of the Interior

Devils Postpile National Monument,
California



Fire and Fuels Management Plan

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1. INTRODUCTION

Need for this Plan

Wildland fire has long been recognized as one of the most significant natural processes operating within and shaping Sierra Nevada ecosystems. Virtually all vegetation communities show evidence of fire dependence or tolerance. At the same time wildland fire has the potential to threaten human lives and property. Consequently there is a need to manage wildland fire so that threats to humans and property are reduced, while at the same time restoring and/or maintaining its function as a natural process.

This *Fire and Fuels Management Plan* (FFMP) provides long- term direction for achieving goals related to human safety and ecosystem management. The program described in this plan was developed following guidelines and requirements of the National Environmental Policy Act and National Historic Preservation Act. A companion *Environmental Assessment* (EA) provides details on the alternatives considered, and assesses the impacts associated with the actions described in this document. This plan also satisfies the requirements and direction provided in policy and legislative authority.

Planning and Consultation

Fire management and resources specialists from Sequoia and Kings Canyon National Parks collaborated with the superintendent of Devils Postpile National Monument, fire managers from the Inyo National Forest, and local communities to develop this plan.

Legislative Authority

Authority for carrying out a fire and fuels management program originates with the Organic Act of the National Park System, August 25, 1916. This Act states that the primary goal of the National Park Service is to preserve and protect the natural and cultural resources found on lands under its management in such manner as will leave them unimpaired for future generations. Additional authorities for fire management activities include: 31 U.S. Code 665 (E) (1) (B) which provides the authority to exceed appropriations due to wildland fire management activities; Section 302 (c) (2) of the Federal Property Administration Services Act of 1949, as amended; and Chapter VIII of the 1983 Supplemental Appropriations Act (P.L. 97- 257) which deals with contracting for fire protection; and The Reciprocal Fire Protection Act of May 27, 1955 (42 U.S.C. 1856) that authorizes reciprocal agreements with federal, state, and other wildland fire protection organizations.

2. RELATIONSHIP TO PLANNING AND POLICY

Interagency Policy

This *Fire and Fuels Management Plan* supports the National Fire Plan which is based on two documents written by the interagency fire community: *Managing the Impact of Wildfires on Communities and the Environment, A Report to the President in Response to the Wildfires of 2000* and *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: a 10- Year Comprehensive Strategy*.

Department Of Interior Policy

Department of the Interior Departmental Manual, DM 910 (USDI 1997) sets policy and priorities related to wildland fires occurring on any DOI lands:

"Wildland fires, whether on lands administered by the Department or adjacent thereto, which threaten life, man- made structures, or are determined to be a threat to the natural resources or the facilities under the Department's jurisdiction, will be considered emergencies and their suppression given priority over normal Departmental programs. Bureaus will give the highest priority to preventing the disaster fire - the situation in which a wildfire causes damage of such magnitude as to impact management objectives and/or socio- economic conditions of an area. However, no wildland fire situation, with the possible exception of threat to human survival, requires the exposure of firefighters to life threatening situations."

The Department Manual also identifies the need for fire management plans to guide resource management objectives and to provide consistency in managing prescribed fire.

"Prescribed fires...may be used to achieve agency land or resource management objectives as defined in the fire management plans. Prescribed fires will be conducted only when the following conditions are met: a) conducted by qualified personnel under written prescriptions and b) monitored to ensure they remain within prescription. Prescribed fires that exceed the limits of an approved prescribed fire plan will be reclassified as a wildland fire. Once classified as a wildland fire, the fire will be suppressed and will not be returned to prescribed fire status."

In summary, the Departmental Manual provides guidance for the prevention, pre- suppression, control and management of fire on lands or threatening lands under the jurisdiction of the DOI.

National Park Service Policy

NPS Management Policies (2001, 4.1.5, 30) summarizes the intent to allow natural processes to predominate in parks:

"The service will re- establish natural functions and processes in human disturbed natural systems in parks unless otherwise directed by Congress. Landscapes disturbed by natural phenomena, such as landslides, earthquakes, floods, hurricanes, tornadoes and fires, will be allowed to recover naturally

unless manipulation is necessary to protect park developments or visitor safety. Impacts to natural systems resulting from human disturbance include. . . and the disruption of natural processes. The Service will seek to return human- disturbed areas to the natural conditions and processes characteristic of the ecological zone in which the damaged resources are situated. The Service will use the best available technology, within available resources, to restore the biological and physical components of these systems, accelerating both their recovery and the recovery of landscape and biological- community structure and function."

NPS Management Policies (2001, 4.5, 38) states the need for effective fire management planning to maintain the natural role of fire in parks:

"Wildland fire may contribute to or hinder the achievement of park resource objectives. Therefore, park fire management programs will be designed to meet park resource management objectives while ensuring that firefighter and public safety are not compromised. All fires burning in natural or landscaped vegetation in parks will be classified as either wildland fires or prescribed fires. All wildland fires will be effectively managed through application of the appropriate strategic and tactical management options. These options will be selected after comprehensive consideration of the resource values to be protected, firefighter and public safety, and costs. Prescribed fires are those fires ignited by park managers to achieve resource management and fuel treatment objectives. Prescribed fire activities will include monitoring programs that record fire behavior, smoke behavior, fire decisions, and fire effects to provide information on whether specific objectives are met. All parks will use a systematic decision- making process to determine the most appropriate management strategies for all unplanned ignitions, and for any prescribed fires that are no longer meeting resources management objectives."

NPS Management Policies (2001) further states that without an approved fire management plan, parks must immediately suppress all wildland fires, taking into consideration park resources and values, firefighter and public safety, and costs.

National Park Service policy, articulated in *Directors Order 18 - Wildland Fire Management* (1998) and *Reference Manual- 18* (1998), require that all parks with vegetation capable of supporting fire develop a fire management plan. This FFMP follows the outline provided by *Reference Manual 18* except that it does not address wildland fire use because all unplanned ignitions within the monument will be suppressed.

Policy also directs the monument to work cooperatively with their adjacent land management and fire management agencies to implement mutually beneficial projects and programs. This plan provides guidance not only for monument staff, but also their neighbors. With clearly stated program goals and objectives, the parks' neighbors will be better able to comment on planning efforts and provide technical assistance.

All of the above directives and policies are incorporated into this *Fire and Fuels Management Plan*.

Establishment and Purpose of Devils Postpile

Devils Postpile National Monument was established by Presidential Proclamation in 1911 to preserve "the natural formations known as the Devils Postpile and Rainbow Falls" for their

scientific interest and for public inspiration and interpretation. Devils Postpile is a dramatic mass of columnar- jointed basalt, the remnants of lava that flowed down the valley of the Middle Fork of the San Joaquin River about 100,000 years ago. Rainbow Falls is a spectacular 101- foot high waterfall on the Middle Fork San Joaquin River.

The mission of Devils Postpile National Monument is to preserve the natural formations known as the Devils Postpile and Rainbow Falls. The mission is evolving to involve ecosystem values of watersheds, biological diversity, sustainable use, and connecting people to parks.

The *Devils Postpile National Monument Strategic Plan* (2000), details the monument's mission and long- term goals with respect to natural resources. It states that: "Natural and cultural resources and associated values are protected, restored and maintained in good condition and managed within their broader ecosystem and cultural context."

This *Fire and Fuels Management Plan* is an operational guide for managing both the monument's wildland fire and fuels treatment programs. The plan implements the goals and objectives outlined in the monument's management plans and details both wildland fire suppression and fuels treatment activities in the monument.

3. WILDLAND FIRE MANAGEMENT STRATEGIES

General Management Considerations

The fire and fuels management program at Devils Postpile National Monument seeks to benefit monument resources and society by restoring and maintaining the natural fire regime in a manner consistent with firefighter and public safety. All fire management actions taken within the monument will give strong consideration to preserving wilderness characteristics, or minimizing the impact from humans on the landscape given the amount of wilderness inside and surrounding the monument.

All wildland fires will be suppressed using appropriate management strategies. Minimum impact suppression techniques will be applied to stop unplanned ignitions and fires burning into the monument from the Inyo National Forest. The monument relies upon interagency cooperation from the Inyo National Forest for initial attack operations on unplanned ignitions.

Fuels treatment will include the use of mechanical tools such as thinning and piling of vegetation to achieve fuels clearance surrounding structures, coupled with burning or chipping of piled material. Prescribed fire may be used to reduce hazardous fuels and/or restore ecosystem health. Fuels treatments will be managed by Sequoia and Kings Canyon National Parks staff working with Inyo National Forest personnel.

Goals

The following goals were developed from the monument's mission statement and National Park Service policy.

1. *Protect and, where applicable, restore the monument's natural, cultural, and social resources.*

Natural resources include the Devils Postpile and Rainbow Falls as well as the ecological values of vegetation, water, wildlife, natural processes, and air resources. Cultural resource values include prehistoric and historic cultural sites, historic structures, and contemporary structures, both government- owned and private. Social values include park employees, visitors, neighboring communities, and wilderness.

2. *Reduce fire hazards in monument ecosystems.*

Fire hazard is defined as those attributes that affect the ability to control fires, or contribute to extreme fire behavior. Certain elements that contribute to hazardous fire conditions, such as steep slopes and the amount of solar radiation that heats fuels and dries vegetation, cannot be changed by management actions. Fuel conditions, however, can be effectively altered by management actions and are the focus of most hazard fuel reduction activities.

3. *Reduce risk of unwanted wildland fire.*

Risk is defined as the probability of new fire starts, whether by human or natural ignitions (lightning). Since lightning ignition risk is outside the realm of management control, the focus of the risk portion of the fire management program is to reduce the probability of unwanted human ignitions.

Objectives

To focus planning and operations, the monument has developed four program objectives that begin to specify the major tasks facing the fire and fuels management staff. Consistent attention to these objectives will achieve the three broad program goals and contribute to national and regional fire policy and strategies.

- 1) Manage all unplanned wildland fires appropriately – Manage all wildland fires, regardless of ignition source or the location of ignition, using strategies and tactics commensurate with protection of human health, safety, and natural and cultural resource values, as described in this approved *Fire and Fuels Management Plan*. Maintain existing cooperative agreements with the Inyo National Forest in order to facilitate close working relationships and mutual cooperation regarding fire management activities.
- 2) Plan and implement appropriate treatments to reduce the threat to values from unwanted wildland fire and to restore or maintain ecological values – Annually analyze fire hazards, values, and risks so that projects are designed within the Fire Management Unit (FMU). Using GIS to plan treatments, ecological, life/safety, infrastructure, and cultural resource values will be analyzed and updated yearly through feedback from monitoring and research advances. Consider and mitigate during the planning phase any negative impacts to cultural and natural resources that might result from management operations.
- 3) Understand the consequences of fire management actions – Monitor and evaluate the effects of fire and fuels management activities on monument natural and cultural resources with particular attention to vegetation, water, wildlife, air, and cultural resources. Evaluate monitoring information to refine the management activities and objectives, and prescription range values as appropriate. For vegetation, utilize ecosystem “restoration” and “maintenance” target conditions developed as one benchmark of program success. Work to ensure that particulates produced by prescribed fire projects remain within all federal, state, and local air resource objectives by monitoring smoke in cooperation with the San Joaquin Valley Unified Air Pollution Control District. Identify issues or missing information needs that, once known, will lead to more effective implementation of the parks’ fire and fuels management program. Conduct research as issues or information gaps are identified through monitoring and evaluation of fire management activities. Understand public attitudes and political concerns through personal contacts, social science research, and other avenues. Incorporate this information into management decisions as appropriate.

- 4) Provide current and accurate information on wildland fire and fuels management activities to the public, the NPS workforce, and cooperating agencies – Provide interpretive and educational programs designed to enhance public and staff understanding and awareness of fire ecology and wildland fire management.

Fire Management Options

Managers have a variety of options for responding to wildland fire and lessening the threat to values from wildland fire. In Devils Postpile these include: wildland fire suppression, prescribed fire, and mechanical fuel reduction. These three options, described below, will be used in conjunction with preparedness activities, public information and education, monitoring, and research which are discussed later in this document (Chapters 4, 6, 7, and 9).

Wildland fire suppression is the management of unplanned wildland fires, including human and lightning ignited fires, to minimize detrimental resource impacts from such fires. Suppression fires will receive appropriate management responses that give consideration to monument and nearby resource values, hazards, and risks.

Prescribed fires are ignited by management to achieve resource objectives, most often a combination of ecosystem restoration or maintenance objectives and reduction of high hazard fuel loadings. These objectives are not mutually exclusive and usually all prescribed fire operations contain a mix of them.

Mechanical fuel reduction is the use of mechanical equipment (i.e. weed whackers, chainsaws, dozers, rubber tired skidders, chippers, etc.) to cut and remove, or prepare for burning, woody fuels. Mechanical treatments are used around developments. Mechanical treatments are intended to help in achieving resource management objectives, most often a combination of ecosystem restoration and reduction of high hazard fuel loading objectives, in the vicinity of monument structures.

Table 3-1 – Goals, Objectives, and Fire Management Options

Fire Management Goals	Program Objectives	Options						
		Wildland Fire Suppression	Preparedness Activities	Mechanical Fuel Reduction	Prescribed Fire	Monitoring and Evaluation	Research	Public Information and Education
Protect and restore the parks' ecological, cultural, and social values. Ecological values include vegetation, water, wildlife, natural processes, and air resources. Cultural values include prehistoric and historic cultural sites, historic structures, and contemporary structures, both government-owned and private. Social values include park employees, visitors, neighboring communities, and wilderness. Reduce fire hazards in park ecosystems. Fire hazard is defined as those attributes that affect the ability to control fires, or contribute to extreme fire behavior. Fuel conditions can be effectively altered by management actions and are the focus of most fuel hazard reduction activities. Reduce risk of unwanted wildland fire. Risk is defined as the probability of new fire starts, whether by human or natural ignitions (lightning). The focus of the risk portion of the fire program is to reduce the probability of unwanted human ignitions.	1. Manage all unplanned wildland fires appropriately.	X	X					
	2. Plan and implement appropriate treatments to reduce the threat to values from unwanted wildland fire and restore or maintain ecological values.		X	X	X		X	
	3. Understand the consequences of fire management actions.					X	X	X
	4. Provide current and accurate information on wildland fire and fuels management activities to the public, the NPS workforce, and cooperating agencies.		X			X		

Figure 3-2 – Map of Devils Postpile Fire Management Unit (FMU) with wilderness boundaries

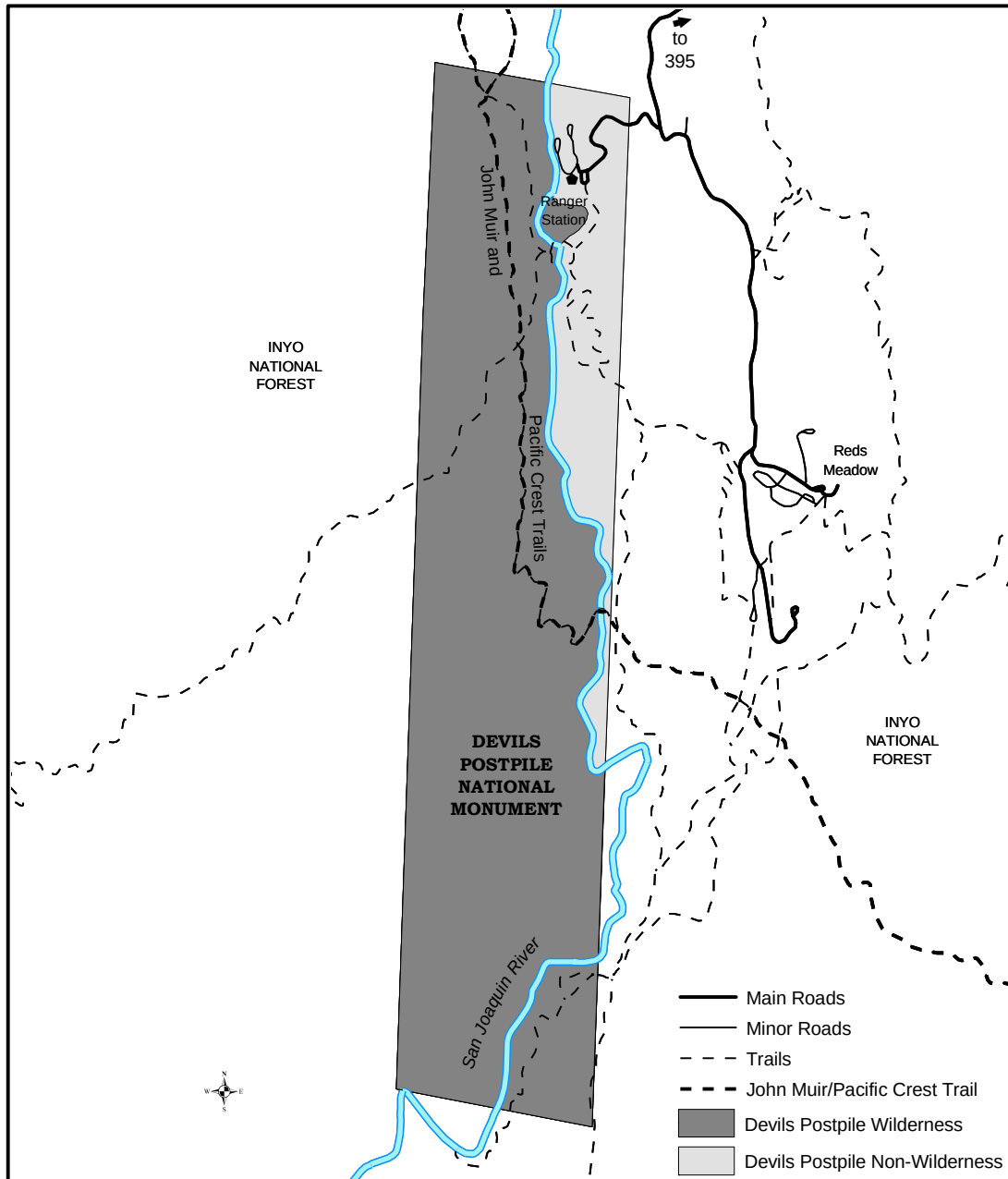
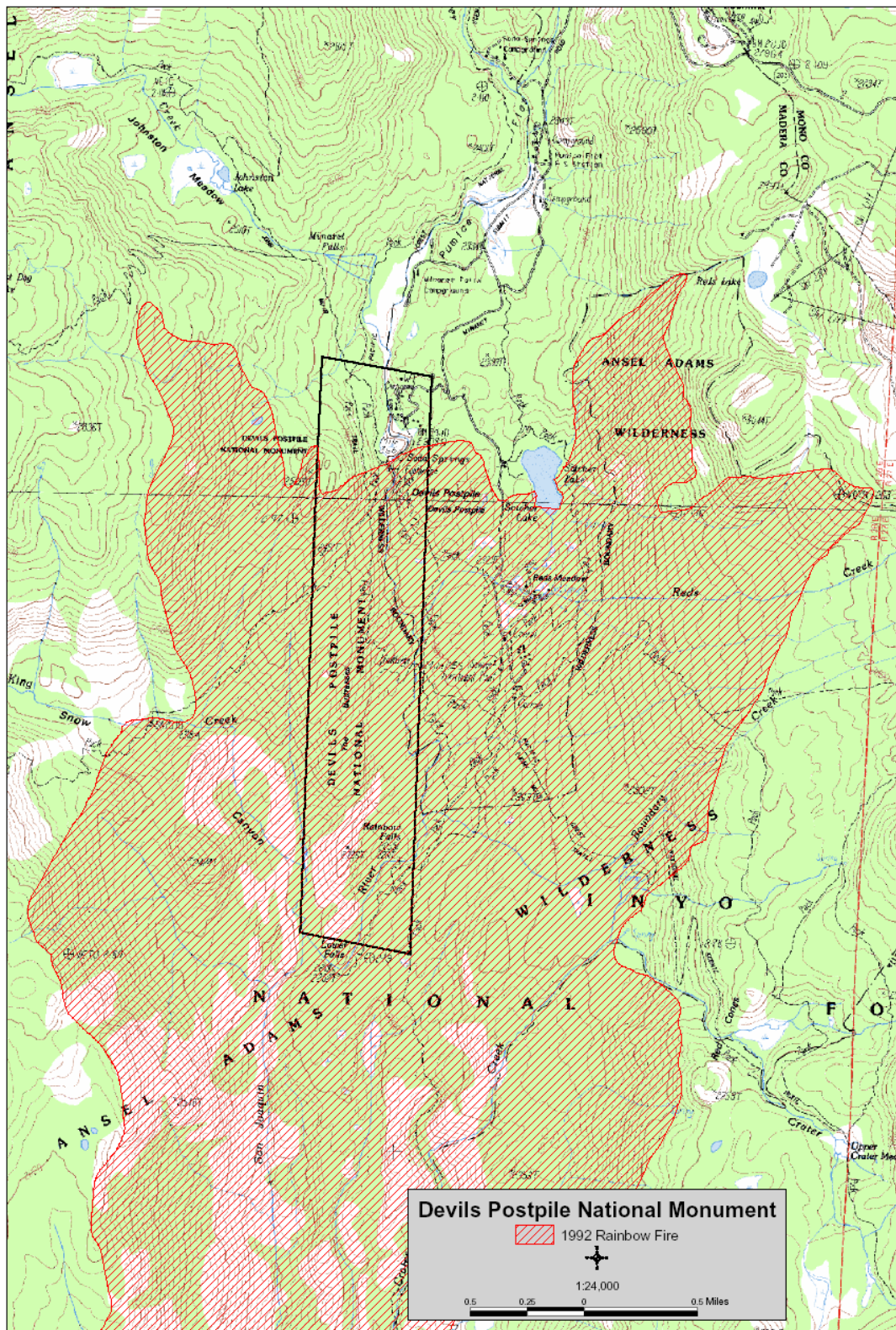


Figure 3-3 – Rainbow Fire Perimeter (1992)



Description of Fire Management Unit

Identification of Fire Management Units (FMUs) is the cornerstone for managing the wildland fire program. The monument will be managed as a single FMU (see Figure 3- 2) which is described below.

Table 3-4 – Description of Fire Management Unit (FMU)

DEPO FMU	
Size and Range	
Total	800 acres
Wilderness	747 acres (90% of the monument)
Elevation range	approximately 7,150 to 8,320 feet
Climate	
The climate of the area varies greatly with the seasons. Winters are generally severe while summers are moderate. The nearby community of Mammoth Lakes exhibits daily average high temperatures of 37°F in January and 79°F in July. Annual precipitation at Mammoth Lakes is 23 inches, most of which falls as snow in December and January. Snow accumulation in the monument in most years is substantial. Summer months are mainly dry, with thunderstorms at times in late summer and fall.	
Geology and Hydrology	
The geologic history of the area is complex. Major land-forming processes displayed in the monument include faulting and earthquakes, volcanism, and glaciation. The Middle Fork of the San Joaquin River is another major force in sculpting the land. The river passes through the length of the monument and varies greatly in character as it flows through a wide range of terrain and geologic features. Flows in the river fluctuate significantly throughout the year, with major flows during spring snowmelt and significantly reduced flows later in the summer and early fall.	
Vegetation	
Though small in size, the monument is diverse enough in its topography and geology to support a number of different plant communities. Species characteristic of both the wetter western and drier eastern slopes are present in the monument because of its proximity to the Sierra Crest. The dominant mixed coniferous forest gives way to a riparian zone along the river, and in other places to small meadows, seeps and sag ponds. As elsewhere in the Sierra Nevada, fire has played an integral role in the development and maintenance of most vegetation communities. Mid-elevation coniferous forests on the west slope of the range have been subject to frequent lightning-ignited fires. Pre-Euroamerican fire frequency was related to elevation, aspect and vegetation type with frequent fires (6-17 yrs) in lower mixed-conifer forests declining with increasing elevation (Caprio & Swetnam 1995, Swetnam et al. 1998, Caprio 2004).	
Air Quality	
The monument's location in Madera County makes it part of California's San Joaquin Valley Unified Air Pollution Control District (hereafter referred to as the Air District). The Air District is in non-attainment status for PM10, severe non-attainment for ozone (8hr), and extreme non-attainment for ozone (1hr).	

DEPO FMU

Rainbow Fire

The 1992 Rainbow Fire burned 85% of the monument's land following an extended 80-plus-year period of fire suppression. Effects of this fire will persist and have long-term ramifications on the vegetation in the monument. Tree mortality in the southeast and western portions of the monument was nearly 100%. A shrub and herb dominated landscape has replaced forest vegetation. This vegetation differs in relative composition and structure from that which occurred before the burn. These changes are believed to be outside of the normal range of variability that would have occurred in the area prior to the extended period of fire suppression. Of course, some past fires would have been hot, but in concentrated areas, not to the spatial extent of the Rainbow Fire. Additional fires in the Rainbow Fire area would likely kill most of the limited tree regeneration and tend to perpetuate unnatural conditions.

Wilderness Resources

Approximately 90 percent (747 acres) of the monument and most of the National Forest land adjacent to the monument is designated wilderness. Wilderness plays a role in the overall health of ecosystems, by providing natural areas without roads or human residents, and valuable habitat for wildlife and plants. It is characterized by its outstanding opportunities for solitude, where people are visitors who do not remain.

Cultural Resources

Evidence has been found in the monument of prehistoric uses of the area, with seven prehistoric sites inventoried based on the presence of tools, points, and chips. It is considered likely that the Postpile was the locale for seasonal hunting and fishing camps used by Northern Paiute and/or Northfork Mono groups. However, the archeological sites are modest in size and materials and analyses conducted thus far have not provided the basis for definitive conclusions about the peoples using the area and the nature of the uses.

Historic uses of the area date from the 19th century. A toll road known as the French Trail, developed in 1879-80 to connect the mining enterprises at Mammoth to the east with the Central Valley to the west, passed through Reds Meadow, crossed the river and then continued up King Creek. Miners are also thought to have maintained camps in the area at this time and worked nearby mines. Some evidence also suggests the location of late 19th century summer shepherd camps within the monument, and the remnants of "Postpile Joe's" trapper cabin dating from the early decades of the twentieth century can still be seen.

The state of knowledge regarding cultural resources in the monument is fairly good. An archeological survey of all surveyable land within the 800 acres of the monument was conducted in 1992, following the Rainbow Fire. The survey report did indicate the need for additional analysis of the available site information to more clearly identify periods and types of use and ethnography. All existing structures in the monument, including the rustic ranger station, have been evaluated for historic significance and found not eligible for the National Register.

Land Use and Infrastructure

Most of the monument is undeveloped except for trails. An area of about 5 acres at the north end contains visitor service and administrative facilities. There are no inholdings or rights-of-way in the monument.

Lands in the monument west of the Middle Fork of the San Joaquin River are part of the Ansel Adams Wilderness, a unit of the National Wilderness Preservation System. Management policies for wilderness areas are aimed at minimizing human intrusions. The use of mechanized equipment in such areas is extremely limited, and improvements are limited to those essential for access and use. Visitor use levels are controlled as needed to maintain pristine conditions.

The Pacific Crest National Scenic Trail, a unit of the National Trails System extending from Mexico to Canada, passes through the monument. The Pacific Crest Trail is managed on a cooperative basis by the agencies whose lands are crossed. The Forest Service has overall responsibility for coordination on this trail.

DEPO FMU

The Middle Fork of the San Joaquin River through the monument is a state-designated Wild Trout water. As such, the state does not stock this reach of the stream with hatchery fish.

Cooperators and Neighbors

The monument is surrounded on all sides by Inyo National Forest. Forest land west of the river is managed as wilderness with the same basic objectives as the monument. Forest lands east of the river are managed primarily for recreation, with several camp areas and other recreation sites in close proximity to the monument.

The Town of Mammoth Lakes, long a resort center offering winter accommodations for visitors to the nearby ski area, has in recent years grown rapidly as a year-around resort destination, with the monument a prominent attraction for summer visitors. Further expansion of tourist facilities at Mammoth Lakes can be expected to lead to increased visitation at the monument.

Reds Meadow Resort and Pack Station is also located nearby and provides organized pack trips in the nearby mountains. A café, store, and limited overnight accommodations are provided at the resort, in addition to extensive stock handling facilities.

Access

The monument and several Forest Service recreation sites occupy a narrow valley accessible to motor vehicles only by a single steep and narrow road descending from the east. This road is closed to most private vehicle use during the summer season from 7:30 AM until 5:30 PM. A shuttle bus originating at the Mammoth Mountain Ski Area, 10 miles away, provides access to the monument, Forest Service sites, and Reds Meadow during this period.

Fire Regime

Fire history studies, based on tree-ring studies of fire-scarred trees in the Sierra Nevada, show that most vegetation communities existed with some influence from fire. Fire occurrence may have been frequent with regular occurrence (every 3-5 years) or rare and episodic. However, since the late 19th century a policy to suppress all fires has met with a fair degree of success. Consequently, species that require fire for survival or to regenerate and vegetation communities that developed in the presence of fire have experienced an unprecedented period without fire (Caprio and Graber, 2000). This change in the fire regime has resulted in important and often quite drastic ecosystem changes. In mixed-conifer forests, stands have become denser in many areas, with increased dominance of shade-tolerant species. Shrubs and herbaceous plants are probably less abundant than in the past (Kilgore and Biswell 1971, Harvey et al. 1980). Perhaps most importantly, dead material has accumulated, causing an unprecedented buildup of surface fuels (Agee et al. 1978, van Wagtendonk 1985). Additionally, "ladder fuels" capable of conducting fire into the crowns of mature trees have increased (Kilgore and Sando 1975, Parsons and DeBenedetti 1979). One of the most immediate consequences of these changes is an increased hazard of wildfires sweeping through the mixed conifer forests with a severity that was rarely encountered in pre-Euroamerican times (Kilgore and Sando 1975, Stephens 1995, 1998).

On the dry east slope of the Sierra Nevada, east of Devils Postpile, Stephens (2001) found mean fire return intervals of 9 years and 24.7 years respectively at two adjacent sites in Jeffrey pine and upper montane forest. Preliminary data from a fire history study within the monument (Caprio 2004, Caprio unpublished data) indicate that lower elevation areas of mixed-conifer (dominated by Jeffrey pine, red and white fir) experienced repeated fires each century (fire intervals ranged from seven to 33 years). Higher elevation and more northern areas of the monument experienced fire less frequently or very rarely (forests dominated by lodgepole pine, red fir, western white pine with mountain hemlock in areas with very rare fire occurrence). This variation appears to be the result of topographic barriers to fire spread up the San Joaquin River drainage and changes in vegetation and fuel with elevation.

DEPO FMU

Historical Weather Analysis

The monument has a Mediterranean climate with respect to the fact that 95% of the precipitation falls between the fall and spring months, (October to May). The weather throughout the summer and fall months is generally hot and dry, but subject to readily identifiable frontal passages during the early and later parts of summer. These frontal passages are generally non-existent during the main summer months of June through August. Thunderstorms and lightning are common during the main part of summer, July and August. Thunderstorms and lightning may occur before July and after August, but fuel moisture is normally sufficient to prevent significant fire danger or fire behavior problems. Marine air occasionally moves into the forest from the west (out of the San Joaquin Valley), dropping temperatures, raising relative humidity, and generally reducing fire danger and fire behavior for short periods without any long-term effects. Such intrusions are relatively infrequent, and cannot be counted on for reducing fire potential.

During the fall and winter months the monument experiences foehn winds (called locally mono winds), which are winds of compressed heating from the north, but some times from the northeast or even east. Ignitions occurring on the monument during these wind events have the potential for extreme fire behavior. The monument generally receives winter-like storms beginning in October or November that reduce or eliminate fire danger until late spring or early summer. The main fire problems occur between the transition months of late spring to early summer and from late summer to early fall. Early summer problems can have thunderstorms with dry lightning and little precipitation. The late summer and early fall months can have fire problems with strong foehn winds with low humidity.

Fire Season

The fire season on the east side of the Sierra crest has an unusual pattern. The Eastern Sierra has a seasonal wind phenomenon beginning in late winter and lasting through the spring. Since green-up hasn't yet occurred, these winds result in a significant number of large, early-season fires. Although about 90 percent of the fire starts typically occur between mid-May and early-October, significant acreage is often burned in the February through June period.

In general, on the northern and higher elevations of the Inyo National Forest inclusive of the monument, the burn window is in the spring from April through June and then in the fall from mid-September until early December and occasionally into January. There can be a substantial overlap of "fire" and "burning" seasons in both spring and fall. Often the fall window can have a very short duration. It is not unusual for weather and fuel conditions to change from "too hot" for prescribed burns to "too cool" in a matter of hours.

Current research on differential flora and fauna responses to the season of burning is being done in Sequoia National Park and across the nation. As results from these initiatives become available, the knowledge generated will be used to improve the fire management program.

Fuel Characteristics

The monument's fuel types are best represented by either closed-canopy timber or wetter brush models. Fuel models 8, 10, and 5 are indicative of fire behavior modeling. Areas not burned in the Rainbow Fire are represented by the timber models. While some pine component is present west of and near the river, it is not enough to warrant its own modeling zone. The Rainbow Fire area is best modeled as brush.

Resistance to control is actually higher in the Rainbow Fire zone due to collapsing snags adding to the fuel load. On high fire danger days, starts in the Rainbow Fire zone are expected to generate rapid rates of spread. The Inyo National Forest fire danger rating weather stations typically display more than four months of fire danger rating in the high to extreme range each year.

The main ignition source for the monument is expected to be its visitors. Visitor use on both the Forest and the monument is high and increasing in numbers. Numerous opportunities will exist for starts during the summer and fall months.

DEPO FMU
The following fuel model distribution depicts NFFDRS (National Fire Danger Rating System) fuel models: Fuel Model G and Fuel Model F.
Control Problems The most significant feature that contributes to wildland fire control problems is the large areas of brush vegetation that occupies the Rainbow Fire area. On days of very high to extreme fire danger, any starts will require rapid initial attack response to achieve successful suppression.
Fire and Fuels Objectives for Unit • Restore and maintain natural ecosystem function to the extent possible using prescribed fire, mechanical fuel reduction, and fire suppression. • All wildland fires starting in the unit will be suppressed using the appropriate management response consistent with values to protect. Minimum Impact Suppression Tactics (MIST) will guide all tactical implementation. • Fuel reduction will include the use of mechanical treatments near structures and prescribed fire. Mechanical treatments will generally involve the use of chainsaws to cut and thin woody materials near structures followed by piling of the created debris. Prescribed fire will be used to dispose of the piled material and to achieve hazard fuel reduction or ecosystem restoration or maintenance goals on unit lands.
Values to be Protected <u>Special Designations and Features:</u> The two significant geologic features in the monument are the columnar basalt formation giving the monument its name and Rainbow Falls. While neither can be impacted by fire, the scenery surrounding both geologic features can be impacted. It would be desirable to limit high severity fire spread near both features to lessen negative vegetation changes. In addition, 90% or 747 acres of the monument is designated Wilderness. This designation necessitates Minimum Impact Suppression Tactics (MIST) for any wildland fire operation in the monument that occurs in Wilderness. <u>Monument Developments:</u> The monument has limited structures. Structures are concentrated near the north end of the monument which will simplify structure protection from unwanted fires and help with fuels reduction activities surrounding the buildings prior to any unwanted fire. <u>Vegetation:</u> Because such a large portion of the monument burned in the Rainbow Fire with fairly high severity, fire management options will mostly concentrate on suppressing fire starts in order to give the monument a chance to recover.
Further Compliance Needs The scope of proposed actions and their expected effects are described in the companion Environmental Assessment (EA). All mitigating actions contained in the EA will be implemented for projects conducted within this unit. Cultural resource consultation with the park archeologist will take place during the planning phase for all projects. In addition, mechanical fuel projects will require consultation with wildlife and plant ecologists during the planning phase to ensure adequate protection for site specific species. Other than actions noted above or as contained in the EA, no additional environmental compliance will be required for projects that fall within the scope of projects and effects described in the EA.

4. WILDLAND FIRE PROGRAM COMPONENTS

General Implementation Procedures

All unplanned wildland fires will be suppressed using the appropriate management strategy in a prompt, safe, and cost-effective manner with minimum damage to resources. The appropriate suppression response taken will ensure firefighter safety, public safety, and resource protection. Resource impacts of suppression alternatives must always be considered in selecting a fire management strategy. Minimum impact suppression techniques (MIST) will be used in all wilderness areas. Use of mechanical equipment will not be authorized without the approval of the superintendent.

Sequoia and Kings Canyon National Parks fire management staff serve as the subject matter experts who provide oversight and coordination on fire management issues for the monument. As such, all fire management work for the monument begins with park staff.

Wildland Fire Suppression

Initial wildland fire response will be conducted by Inyo National Forest resources under the Suppression Response Plan (Addendum). All fires not classified as prescribed fires are wildland fires and will be appropriately suppressed.

All wildland fires will be assessed individually by preparing the appropriate level of a *Wildland Fire Implementation Plan* (WFIP). From this plan the *appropriate management response* will be chosen. The procedures that will be followed are outlined in Chapter 4 of the *Wildland and Prescribed Fire Management Policy Implementation Procedures Reference Guide* (Addendum). Assessment includes data gathering and situation analysis (i.e. internal and external values which are enhanced or require protection, management objectives, safety, climatology and weather, fuel conditions, and fire behavior). The *appropriate management response* ranges from monitoring with minimal on-the-ground disturbance to intense suppression actions on all perimeters of the fire. The response may vary from fire to fire and even between different sections of the perimeter of a single fire.

For extended attack and large fire response, Sequoia and Kings Canyon National Parks fire staff will work with the Inyo National Forest to continually validate that the fire is managed appropriately and will assess the need to complete a *Wildland Fire Situation Analysis* (WFSA). Examples of situations that may indicate the need for WFSA completion include: 1) not meeting control objectives by the end of the second burning period, 2) incrementally increasing number of resources to achieve containment objectives, and 3) unexpected fire behavior. Completed WFSAs will allow for the full range of strategic and tactical actions from full suppression on all perimeters to confinement within a drainage or area. If the fire exceeds the capabilities of local Inyo National Forest resources, crews and overhead will be requested from outside the Forest. If the management complexity of the fire exceeds the capabilities of these local resources, the Forest and parks fire staff will manage the incident through delegation to a Type II or I Incident Management Team (see Appendix F).

Monitoring and Rehabilitation

Every fire will receive periodic assessment until declared out. Rehabilitation will follow Minimum Impact Suppression Techniques (MIST) as outlined in the *Interagency Standards for Fire and Fire Aviation Operations 2004* handbook (Addendum). In the event a fire covers large areas, has unnaturally severe effects on natural and/or cultural resources, or causes major impacts to the monument's developed resources (i.e. trail system) a separate *Burned Area Emergency Rehabilitation Plan* will be developed, and be approved by the monument superintendent.

Documentation and Cost Tracking

Fire reports for monument fires will be generated by Inyo National Forest employees as first responders, then shared with Sequoia and Kings Canyon National Parks fire dispatch office for input into the Department of Interior wildland fire reporting system. For large fire response, a final fire narrative will be shared with the monument superintendent and Sequoia and Kings Canyon National Parks fire staff by the outgoing incident management team. All expenditures (personnel, aircraft, supplies, and equipment) will be tracked and reported according to the standards established in the Department of the Interior Individual Fire Occurrence Form (DI-1202). All wildland fires will have an appropriate fire management accounting code.

Preparedness Actions

Preparedness is the work accomplished prior to fire occurrence to ensure that the appropriate management response, as directed by the *Fire and Fuels Management Plan*, can be carried out. Preparedness activities include fire prevention, training and fitness, fire readiness, and suppression response plan.

Due to the small size of the monument and number of personnel, the monument will establish a clear operational process that allows the Inyo National Forest to effectively suppress wildland fires within the monument and provides a clear set of objectives for other fire management activities initiated by the monument. The following preparedness actions will be taken to ensure adequate fire preparedness.

Fire Prevention

An active fire prevention program will be conducted in conjunction with the Inyo National Forest to protect human life and property, and prevent damage to monument resources. It is essential that employees be well informed about fire prevention and the objectives of the site's fire management program. Further, employees must be kept informed about changes in existing conditions throughout the fire season.

Trained employees need to relate information to the public essential to understanding the potential severity of human- caused wildland fires and how to prevent them. During periods of extreme or prolonged fire danger, fire prevention messages will be included in interpretive programs. Instructions regarding public information and education can be found in Chapter 9.

Emergency restrictions regarding fires or area closures may become necessary. Such restrictions, when imposed, will be consistent with those implemented by the Inyo National Forest. Closures will be authorized by the Superintendent.

Training and Fitness

Departmental policy requires that all personnel engaged in wildland fire management duties meet the standards set by the National Wildfire Coordinating Group (NWCG) as well as Department of Interior standards. These standards call for medical exams and fitness testing for arduous duty fireline assignments, as well as completion of required course work and task book certification for fireline positions. The National Park Service wildland fire qualification system meets or exceeds all NWCG and Department of Interior standards. Devils Postpile National Monument will conform strictly to the requirements of the NPS wildland fire management qualification and certification system.

The monument has no fire management staff. Sequoia and Kings Canyon National Parks fire management staff serve as the subject matter experts for the monument's fire management needs. As such, they must advise the monument Superintendent on appropriate fire management activities, including training and fitness. These parties have agreed that the Inyo National Forest fire management program can best meet the suppression response needs of the monument. None of the monument staff are red- carded for fireline duty. If any staff is carded for duty, Sequoia and Kings Canyon National Parks fire management employees will work with the Inyo Forest to obtain the required training and supplies to outfit monument firefighters. Given the limited number of fire responses required, the current Superintendent has elected to not pursue this course.

Fire Readiness

Fire readiness is the year- round organized inventory and assessment of equipment and personnel. Since the monument's suppression response needs are covered under agreement with the Inyo National Forest, their readiness documentation applies.

Suppression Response Plan

Each spring, a meeting will be required of Sequoia and Kings Canyon National Parks fire staff, Inyo National Forest fire staff, and the monument superintendent to review and update the monument's suppression response plan and associated agreements. The plan outlines monument fire management objectives and constraints so that initial attack response can be successfully implemented. In addition, information necessary for the successful transition to extended attack and large fire response is provided. In the event of extended attack and transition to large fire response, Sequoia and Kings Canyon National Parks' fire staff will provide agency representation for the monument's superintendent.

Mechanical Fuel Reduction

Mechanical fuel reduction is the use of mechanical equipment (i.e. weed whackers, chainsaws, dozers, rubber tired skidders, chippers, etc.) to cut and remove, or prepare for burning, woody fuels. In the monument, mechanical treatments will generally involve the use of chainsaws to cut and thin woody materials near structures followed by piling of debris. Mechanical treatments

are intended to help in achieving resource management objectives, most often a combination of ecosystem restoration and reduction of high hazard fuel loading objectives. Mechanical treatments must be described in a mechanical treatment plan. The plan will contain a prescription defining goals, objectives, and treatment methods employed to achieve the objectives (Appendix E). Fuels management prescriptions are detailed in Appendix G. Projects outside the bounds of this environmental assessment will require further environmental analysis unless covered under the Healthy Forests Initiative Act.

Mechanical treatment may be used in concert with prescribed fire treatment. High hazard fuel conditions can be reduced while meeting structural objectives in areas immediately adjacent to infrastructure values or in boundary areas through a mix of mechanical treatment and prescribed fire. Mechanical treatment can be used as the primary method of reaching structural goals while prescribed fire actually removes the hazardous fuels.

Examples:

- Prescribed fire has been used extensively to reduce fuels and restore natural conditions in a large area uphill from a development. However, the fuels complex immediately adjacent to the structures presents significant prescribed fire control problems and the only practical method for reducing the hazardous fuels adjacent to the structures may be through the use of mechanical techniques and then burning the slash pile accumulations.
- Heavy fuels immediately adjacent to structures, if burned, will cause an unacceptable amount of large trees to be injured or killed resulting in an increase in hazard trees. Mechanical treatment is used before prescribed burning in order to reduce the potential of the burn causing future hazard trees.

Planned Treatment

- **Conduct initial survey to identify areas** that need prescribed fire and/or mechanical treatments by evaluating values, hazards, and risks for the monument. Repeat this survey every five years or more often if determined as being necessary. Situations which may require more frequent surveys are if a large wildland fire burns through the monument (i.e. – such as the 1992 Rainbow Fire), or if significant fuels manipulation is accomplished before the end of five years. The monument geographic information system (GIS), which is located at SEKI, is the primary data storage and analysis system employed to achieve this goal. Where appropriate, treatment across agency boundaries is encouraged and facilitated.
- **Select treatment priorities** based upon the analysis of the values, hazards, and risks. Consider managerial capabilities to accomplish treatments given practical limitations in planning, finance, and logistical support.
- **Write an annual fuels treatment plan if fuels treatment is planned for a particular year** that describes the program for the up- coming field season including descriptions of individual segment preparation and execution needs. Insert this annual plan into a revised *5-Year Fuels Treatment Plan* (Appendix A). This document is completed in the spring following consultation with monument staff, Fire Management Committee review and concurrence, and superintendent approval.
- **Distribute the *Fuels Treatment Plan*** to monument staff, SEKI staff as appropriate, and cooperators.

- **Submit the *Fuels Treatment Plan* to the Air District for review.** For mechanical treatment work only, the Air District will not need to review plans. They will review prescribed fire plans that will be developed to treat mechanically generated fuels.
- **Assign project leaders to individual treatment segments.** Project leaders scout the area so that the segment's mechanical treatment plan can be written and crews can begin work. All NPS owned structures will be protected to a reasonable extent from unplanned fire events by the clearance of hazardous fuels on an annual basis. This hazard abatement work will comply with California Public Resource Code (PRC) 4290. Work will be performed by a combination of park fire crews, monument residents, and maintenance grounds keeping crews.
- **Identify the minimum tools required** to complete the project if any portion of the mechanical segment falls within designated wilderness. The use of mechanized equipment in wilderness (including chainsaws and helicopters) must be justified and pre- approved by monument management in non- emergency incidents. This analysis process can be documented in the mechanical plan (completed by the project leader and signed by the Superintendent) or in an annual wilderness operations program submitted by fire managers.
- **Complete mechanical treatment plans** by pay period 15 each year giving the monument staff, SEKI fire management staff, Chief Ranger, and Superintendent adequate time to address any remaining issues associated with the proposed treatment.
- **Notify the public about the annual project list.** At the beginning of fire season, notify local communities, media, businesses, agency partners, and employees about upcoming projects for the year.

Project Implementation

- **Notify the public about the upcoming mechanical project.** Use contact lists and communication methods from *Standard Operating Procedures: Fire and Fuels Information* (Addendum).
- **Monitor vegetation/fuels** against prescriptive criteria.
- **Assess effects of monument and SEKI fire management staff workload** on successful outcome for the project.
- **Notify the public** about the planned treatment.
- **Hold briefing** and review treatment objectives and operations with treatment staff.
- **Begin implementing project.** All projects involving treatment of fuels adjacent to structures must comply with California Public Resource Code 4290.
- **Provide interpretive information** if adjacent to visitor- use area.

Post- Project

- **Rehabilitation** will follow Minimum Impact Suppression Techniques (MIST) as outlined in SEKI's *Fire and Aviation Management Operations Guide* (Addendum). Rehabilitation will be accomplished by the end of the following field season.
- **Assemble monitoring data** as part of the final fire package.
- **Review incident** when deemed appropriate by monument staff, SEKI fire management staff, Superintendent, or Fire Management Committee.

Staffing Needs and Responsibilities

The Kings Canyon District FMO is responsible for the implementation of the mechanical treatment program. This person works closely with the SEKI Fuels Management Specialist on

the development of the annual program and *5- Year Fuels Treatment Plan*. Mechanical hazard fuels abatement prescriptions can be found in Appendix G.

All fire and fuels management activities in the monument will rely on tactics that minimize resource damage while maintaining the safety of the public, firefighters, and other personnel. Tactical tools that are used will be chosen based on a minimum requirement / minimum tool (MR/MT) analysis.

Documentation and Cost Tracking

The project folder will contain copies of all documents as outlined in Appendix B (Wildland and Fuels Management Reporting Requirements). The folder will include: all planning documents (treatment plan and any amendments, incident action plans), monitoring data and summary reports, personnel time reports, maps, photos, and fuels accomplishment summary reports. All expenditures (personnel, aircraft, supplies, and equipment) will be tracked and reported according to the standards established in the Department of the Interior Individual Fire Occurrence Form (DI- 1202). All projects will have an appropriate accounting code.

It will be the responsibility of the Kings Canyon District FMO, or his/her project leader to ensure treatment report completion. The report is a valuable tool as it provides an historical record of the fuels treatment history for the monument. At this time DI- 1202's cannot be completed for mechanical treatments. They are only completed for projects involving fire occurrence. It will be the responsibility of the SEKI Fuels Management Specialist to input all fuels accomplishments into the National Fire Plan Operations and Reporting System (NFPORS).

Special Considerations

Slash fuels that are derived from mechanical treatments and hazard tree removal operations can be burned for disposal purposes. Slash piles within the monument will be burned by either NPS fire personnel, USFS fire personnel, or a certified contract fire crew, and will adhere to prescribed fire guidelines per RM- 18.

The Kings Canyon District FMO is responsible for the coordination of burning slash piles within the monument. Slash pile burning operations will comply with RM- 18. Slash produced from mechanical projects may also be chipped in place, or chipped and hauled away from the site as indicated in the individual treatment plans.

Prescribed Fire

Definition

Prescribed fires are ignited by management to achieve resource objectives, most often a combination of ecosystem restoration or maintenance objectives and reduction of high hazard fuel loadings. These objectives are not mutually exclusive and usually all prescribed fire operations contain a mix of them. As all lightning- caused fires in the monument are suppressed, prescribed fire may be used to replace these suppressed natural ignitions.

Prescribed fires must be described in a prescribed fire burn plan. The plan will contain a prescription defining goals, objectives, and treatment methods employed to achieve the objectives (Appendix E). Fuels management prescriptions are detailed in Appendix G.

Prescribed fire may also be used in concert with mechanical treatment. High hazard fuel conditions can be reduced while meeting structural objectives in areas immediately adjacent to infrastructure values or in boundary areas through a mix of mechanical treatment and prescribed fire. Mechanical treatment can be used as the primary method of reaching structural goals while prescribed fire actually removes the hazardous fuels.

Examples:

- There is a hazardous accumulation of fuels adjacent to infrastructure values that can be mitigated with the use of prescribed fire. The main objective of the burn operation will be reducing high hazard fuels with ecosystem restoration as a secondary consideration.
- There is a drainage that requires restoration of the ecological fire process. There are no infrastructure values or boundary issues. The main objective of the burn will be restoration of ecological processes. The secondary objective will be reducing high hazard fuels.
- There is a drainage that has been prescribed burned for ecosystem restoration. The drainage has missed 1 or 2 fire return intervals and is showing signs of high hazard fuels build-up, species composition shift, and increased stand density. The main objective of the burn will be for ecosystem maintenance purposes.

Planning

- **Conduct initial survey to identify areas** that need prescribed fire and/or mechanical treatments by evaluating values, hazards, and risks for the monument. Repeat this survey every five years or more often if determined as being necessary. Situations which may require more frequent surveys are if a large wildland fire burns through the monument (i.e. – such as the 1992 Rainbow Fire), or if significant fuels manipulation is accomplished before the end of five years. The monument geographic information system (GIS), which is located at SEKI, is the primary data storage and analysis system employed to achieve this goal. Where appropriate, treatment across agency boundaries is encouraged and facilitated.
- **Select treatment priorities** based upon the analysis of the values, hazards, and risks. Consider managerial capabilities to accomplish treatments given practical limitations in planning, finance, and logistical support. In addition, significant suppression fires (i.e. – any fire which escapes initial attack) will be factored into the decision to implement planned prescribed fire ignitions in the same year.
- **Write an annual fuels treatment plan if fuels treatment is planned for a particular year** that describes the program for the up-coming field season including descriptions of individual segment preparation and execution needs. Insert this annual plan into a revised *5-Year Fuels Treatment Plan* (see Appendix A). This document is completed in the spring following consultation with monument staff, the SEKI fire management committee review and concurrence, and superintendent approval. The annual fuels treatment plan is approved by the SEKI superintendent via a signed Fuels Treatment Verification Form.
- **Distribute the *Fuels Treatment Plan*** to monument staff, SEKI staff as appropriate, and cooperators.

- **Submit the *Fuels Treatment Plan* to the Air District for review.** Note that air quality regulations and requirements are dynamic and subject to change. The process described below is in effect at the time of this document's publication. Updated procedures and requirements enacted after the approval date of this plan will be incorporated in annual updates to the *Fire and Fuels Management Plan*. While the District does not have authority to approve or reject this overall *Fuels Treatment Plan*, it does provide input to the individual prescribed fire burn plan. Air quality concerns remain the major issue affecting prescribed fire treatment.
- **Notify the public about the annual project list.** At the beginning of fire season, notify local communities, media, businesses, agency partners, and employees about upcoming projects for the year.
- **Assign a Burn Boss to each individual treatment segment.** Each Burn Boss scouts the area so that the segment burn plan can be written and crews can begin prep work.
- **Identify the minimum tools required** to complete the project if any portion of the burn segment falls within designated wilderness. The use of mechanized equipment in wilderness (including chainsaws and helicopters) must be justified and pre- approved by monument management in non- emergency incidents. This analysis process can be documented in the burn plan (completed by the Burn Boss and signed by the Superintendent) or in an annual wilderness operations program submitted by fire managers.
- **Complete burn plans** by pay period 15 each year giving the monument staff, SEKI fire management staff, Chief Ranger, and the Superintendent adequate time to address any remaining issues associated with the planned prescribed fire.
- **Submit each individual burn plan to the District for review under Rule 4106.** The Air District has up to 30 days to review individual burn plans. They are required to inform the parks of concurrence or to request changes at the end of the 30- day period. Burn plans will describe the smoke management parameters necessary to provide optimum smoke dispersal based on burn goals and objectives, location, fuel loading and predicted fuels consumption, length of ignition and burn down, and proximity to Smoke Sensitive Areas (SSAs). Burn plan contingencies will also include a description of the decision process that management will take to limit smoke impacts if smoke conditions deteriorate in SSAs and the coordination requirements with the District. Minimum safe roadway visibility is described and the mechanism for maintaining safe use of the roads is explained in detail.
- **Complete the District smoke management summary** and submit with the burn plan. The District uses the smoke management summary to permit burns. Smoke management plans will also describe alternatives considered in lieu of burning and earlier treatments employed which have already reduced potential emissions. Discussion will provide why alternatives were rejected and how earlier treatments have provided mitigation for current burning.
- **Request pre- ignition forecast.** No more than seven days prior to the earliest ignition date, a request will be submitted to the District to begin long- range smoke dispersal forecasting for the proposed ignition (PIFA forecasts). After a seven day waiting period, the District will provide 96- , 72- , and 48- hour outlooks, and 24- hour forecasts on days leading up to the proposed ignition date. The District retains final go/no- go authority until the time of ignition.

Project Implementation

- **Notify the public about the upcoming ignition.** Use contact lists and communication methods from the *SEKI Standard Operating Procedures: Fire and Fuels Information*,

emphasizing the applicable contacts in the monument area (Addendum). In addition to regular information about project logistics, location, and objectives, use appropriate smoke information and recommendations from the SEKI *Smoke Communication Strategy* (Addendum).

- **Monitor weather and fuels** against prescriptive criteria. Prescribed burns are ignited when weather conditions are favorable for dispersing smoke away from Smoke Sensitive Areas (SSAs), or during conditions that dilute smoke so that impacts to SSAs do not exceed health standards. This will be accomplished by utilizing the most current and comprehensive weather forecasting information available for predicting smoke transport direction and concentration down wind. Fuel moisture is also a high priority prescription element that will be monitored pre- burn. Fuel moisture prescriptions are designed to provide the optimum balance between the need to moderate fire behavior, minimize undesired fire effects on other resource values, and minimize smoke production (drier fuels burn cleaner and produce less pollutants). Fuel moisture information will be obtained and analyzed pre- burn for all significant categories of fuels (litter/duff, 1- , 10- , 100- and 1000- hour fuels) to ensure conformity with the prescription.
- **Assess effects of monument and SEKI fire management staff workload** on successful outcome for the burn. Consider the cumulative air quality effects of the upcoming project and any local wildland fires that may already be burning in the area. If effects cannot be mitigated, postpone the planned burn.
- **Obtain Superintendent (SEKI) go/no go decision** on ignition.
- **Seek concurrence from the Air District** to proceed with ignition.
- **Dispersion Intelligence.** Smoke dispersion potential (the capacity of the atmosphere to absorb and disperse smoke) is carefully evaluated prior to a burn being ignited and during unit execution. Several methods can be utilized:
 - Standard National Weather Service fire weather forecasts are reviewed for favorable dispersal winds aloft. Generally, ridge winds from the west at 10 to 15 mph are desirable. Data provided by various Internet sources provide detailed information on regional weather trends.
 - Pre- fire spot weather forecasts are requested from the National Weather Service to provide detailed smoke dispersal information. Predicted unstable atmospheric conditions are optimal, although fire managers must weigh instability against the ability of fire behavior to become erratic and escape. The District's meteorologists provide additional dispersal information for burns at all elevations.
- **Hold briefing** and review burn plan operations with burn staff.
- **Ignite a test- fire.**
- **Make final go/no go decision on ignition** (Burn Boss and associates).
- **Ignition occurs.** Fire Management staff will proactively regulate the number of acres burned each day. Two factors are of critical importance: emissions produced per day and duration of smoke produced. For prescribed fire treatments of forested areas near SSAs, acreage treated in restoration burns may be limited to about 50 acres per day, with twice that acreage for maintenance treatments. This limit serves only as a guide with acreage treated varying due to terrain, proximity to SSAs, fuel conditions (i.e. – loading, dryness, and fuel model), meteorological conditions, etc. Duration of smoke produced from fires will vary with the fuel type. Timber fires, due to fuel loading inclusive of duff, burn for the longest time periods. With half the duff present on most maintenance burns, duration is significantly

reduced. Again, as a general rule, smoke production near SSAs should be kept to less than 5 days before significant reduction in particulate load production occurs.

- **Monitoring of meteorology and air quality conditions** will follow through ignition completion and burn down of remaining available fuels. Qualified fire personnel will conduct all smoke monitoring. Personnel will monitor smoke impacts to SSAs and transmit that information to the Burn Boss to utilize the intelligence gathered to adapt burn execution to avoid unhealthful smoke impacts. This will be accomplished by visual observations on small fires and short duration fires (e.g. grass fires). On fires in close proximity to SSAs, that may be of long duration or possess heavy fuel loading, monitoring will include equipment to measure particulate load production, collect 24 hour weather data, and document visibility conditions with photography.
- **Aerial resources can be used to assess the atmospheric adiabatic lapse rate** before and during burn unit execution- - which helps with interpreting the capacity of the atmosphere to disperse smoke. Helicopter crew members also conduct visual observations of burn unit smoke dispersal and record the observations.
- **Provide on- site interpretative information** if adjacent to visitor- use area.
- **Report daily fuel treatment accomplishments and emissions** to the Air District.
- If the fire exceeds prescription criteria, **notify the SEKI Superintendent and monument staff of the escape and initiate a *Wildland Fire Situation Analysis* (WFSA).**
- **Notify the public when the project is complete.**

Post- fire

- **Rehabilitation** will follow Minimum Impact Suppression Techniques (MIST) as outlined in SEKI's *Fire and Aviation Management Operations Guide* (Addendum).
- **Assemble monitoring data** as part of the final fire package.
- **Conduct After Action Reviews** after each project with the burn participants and appropriate staff.
- **Review incident** when deemed appropriate by monument staff, SEKI fire management staff, Superintendent, or SEKI Fire Management Committee.
- **Report final fuel treatment accomplishments and emissions** for the project to the Air District. Projects greater than 250 blackened acres will be required to complete an Air District post- burn summary.
- **Enter acreage accomplishment into NFPORS.**

Staffing Needs and Responsibilities

The Kings Canyon District Fire Management Officer is responsible for the implementation of the annual fuels treatment program in the monument. This person works closely with monument staff and the SEKI Fuels Management Specialist on the development of the annual program and associated *5- Year Fuels Treatment Plan*. A team comprised of monument staff, the Kings Canyon District FMO, the SEKI Fuels Management Specialist, and the SEKI Fire GIS Specialist will meet to compose the plan. The Kings Canyon District FMO is responsible for prescribed burn plan completion.

Each burn will be staffed by an agency- certified Burn Boss (appropriate to the level required), as well as other staff necessary to conduct the operation safely and efficiently. Working with the SEKI Fuels Management Specialist, the Kings Canyon DFMO will assign Burn Bosses to individual burn units, who must ensure appropriate staff is assigned to each burn. Burn Bosses

and other staff may be provided by local U.S. Forest Service cooperators as is convenient for both agencies. Individual segment burn plans will comply with requirements described in RM-18. Prescribed fire burning prescriptions can be found in Appendix G. Individual prescribed fire operations can last from one day to several months.

Close coordination and strong communication is required between operational overhead, the assigned fire information and education specialist, fire effects and research program staff, general monument staff, local air quality control district staff, and local cooperators and dispatchers. The Kings Canyon District FMO will ensure coordination occurs between the Air District and the Burn Boss. Fire and aviation dispatch will track all PIFA and spot fire weather forecasts, and serve as an information gatekeeper when Burn Bosses are assigned and unavailable for telephone conversations with Air District enforcement staff. The SEKI Fuels Management Specialist will check the whole system ensuring coordination at the burn plan/smoke management plan phase, execution phase, and post-fire stage occurs.

All fire management activities in the monument will rely on tactics that minimize resource damage while maintaining the safety of the public, firefighters, and other personnel. Tactical tools that are used will be chosen based on a minimum requirement / minimum tool (MR/MT) analysis.

Air Quality and Smoke Management

See Appendix C, Smoke Management Plan.

Documentation and Cost Tracking

The fire folder will contain copies of all documents as outlined in Appendix B (Wildland and Fuels Management Reporting Requirements). The folder will include: all planning documents (burn plan and any amendments, smoke permit, incident action plans), monitoring data and summary reports, fire time reports, maps, photos, and DI- 1202. All expenditures (personnel, aircraft, supplies, and equipment) will be tracked and reported according to the standards established in the Department of the Interior Individual Fire Occurrence Form (DI- 1202). All prescribed fires will have an appropriate accounting code.

It will be the responsibility of the Kings Canyon District FMO, or his/her burn boss on the fire to ensure fire report completion. The report is a valuable tool as it provides an historical record of the fire regime for the parks. The DI- 1202 is the basic document used by the National Interagency Fire Center (NIFC) to document a fire occurrence.

Special Considerations

Climatological weather data analysis is used to assess the probability of season ending weather events as an aid in prescribed fire planning. The closest weather station at a similar elevation often serves as the representative record.

4. ORGANIZATION AND BUDGET

Organizational Roles

Superintendent of Sequoia and Kings Canyon

- Supervises Superintendent of Devils Postpile National Monument.

Superintendent of Devils Postpile National Monument

- Has ultimate responsibility and accountability for all fire and fuels management activities in the monument.
- Certifies Fire and Fuels Management Plan and all other plans written within that framework (i.e. WFIPs and their periodic validations, WFSAs, burn plans, and mechanical treatment plans). Approval constitutes the authority to proceed with the actions outlined.
- Reports to Superintendent of Sequoia & Kings Canyon National Parks

Fire Management Officer for SEKI

- Responsible for management of monument's fire program.
- Ensures coordination with all divisions and FMC on fire planning and operations issues.
- Ensures coordination with external agencies for interagency cooperation in fire and fuels management planning and operations.
- Develops program budget annually ensuring a cost efficient program.

Fire Budget Assistant for SEKI

- Serves as subject matter expert for all fire business management issues.

Communications Center/Cache Manager for SEKI

- Ensures 1202 data base for wildland fire responses is current. Integrates this work with GIS specialist for GIS analysis.
- Ensures logistical support for all fire/aviation planning and fuels treatment operations.

Fuels Management Specialist for SEKI

- Principal staff specialist for fuels management.
- Takes lead on yearly fire GIS analysis planning update.
- Coordinates projects with fuels planners from cooperating agencies.

Kings Canyon District FMO

- Responsible for monument's fuels treatment program.

Cache Manager

- Manages logistics in support of all fuels treatment operations.

Fire Ecologist

- Develops and implements fire effects monitoring program based upon structural and process objectives for the vegetation communities. Ensures that results from fire effects

monitoring and fire research are integrated into the fire and fuels management program. Analyzes and reports results from monitoring data so that fire management operations can be adjusted to better meet structural and process objectives.

- Addresses fire related natural resource issues
- Coordinates park research needs.
- Summarizes significant findings of all park fire research in reports circulated internally and externally.

Air Quality Management Specialist

- Serves as air quality specialist.
- Coordinates air quality data and information exchange with Fuels Management Specialist.
- Provides quality assurance/quality control advice for smoke and weather technician.

Fire GIS Specialist

- Maintains fire databases.
- Provides project level spatial analysis and mapping for all fires.
- Provides spatial analysis and map products for fire and fuels management planning.

Fire Information and Education Specialist

- Communicates with internal and external audiences about fire and fuels management program activities.

Fire Management Funding

No funds are currently provided for the monument's fire program. The monument lies within Fire Planning Unit #9, California, along with the Inyo National Forest and Manzanar National Historic Site. Future fire funding is dependent upon the interagency Fire Program Analysis (FPA) System.

6. MONITORING AND EVALUATION

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

Monitoring is essential to determine if management objectives are achieved, as well as to detect unexpected and undesired consequences of management activities. Using feedback from ongoing monitoring results, the fire and fuels management program can adapt to changing needs with the best available information. This monitoring information is especially useful because it is obtained directly from park management activities, and therefore, has direct, local application.

A *Fire and Fuels Monitoring Plan* has been developed for SEKI to describe current monitoring efforts and proposed needs and will be updated annually (Addendum). Fire effects monitoring at DEPO falls under the umbrella of the SEKI Division of Natural Resources fire effects program. The *Fire and Fuels Monitoring Plan* covers the four levels of fire monitoring identified in the *NPS Fire Monitoring Handbook* (NPS 2001) including environmental monitoring, fire observation, short- term effects, and long- term effects. The *NPS Fire Monitoring Handbook* provides guidelines for monitoring fire management activities to meet NPS needs. Because this *Fire and Fuels Management Plan* includes mechanical treatment as a tool for fuel and fire manipulation, the monitoring plan also includes protocols for mechanical treatment monitoring. Guidelines for monitoring mechanical treatments are preliminary, with most of the focus on short- and long- term monitoring, the same as for sites treated with fire.

The *Fire and Fuels Monitoring Plan* applies to monitoring efforts across both spatial and temporal scales, from site- specific up to the landscape- level, and from immediate post- fire to long- term effects. For example, in areas where heavy fuels have accumulated as a result of past fire exclusion, fuels will be monitored to determine when fuel loads have been restored by fire reintroduction. In other areas where fuel and vegetation conditions have not been greatly altered by fire exclusion, or in areas that have been restored, fire frequency, severity, and season will be monitored to insure the long- term maintenance of the historic fire regime. Correspondingly, in areas where mechanical manipulation of fuels is needed (due to presence of human structures) prior to burning of woody debris piles, fuel loads will be monitored as well as vegetation change. In the monument, post- fire recovery of the high severity 1992 Rainbow Fire is being monitored.

The plan describes the monitoring program by subject matter including weather and fire behavior, fuels, vegetation, wildlife, water, cultural resources, and fire regime. Each subject area section outlines monitoring objectives, sampling design (including specific field protocols), locations, and a schedule appropriate for each subject matter area. Monitoring protocols are reviewed at the regional office level to insure that methods are appropriate and funding for monitoring is adequate.

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

7. RESEARCH

Natural science *research* is and will continue to be an important activity in the monument. It serves two primary purposes in relation to the fire and fuels management program. First, it helps to define both natural fire regimes as well as the range of natural conditions that serve as ecological foundations for the application of fire in monument ecosystems. Second, it is used as a tool to evaluate actions used to restore and/or perpetuate desired conditions as contemplated in the policies for management of natural areas in the National Park Service. This research can have either tactical or strategic applications. Such research will continue to be encouraged and supported in an effort to further improve the monument's fire and fuels management program.

While considerable fire related research has been conducted in Sequoia, Kings Canyon, and Yosemite National Parks on the west slope of the Sierra Nevada few studies have included Devils Postpile. However, information from these studies is somewhat applicable to the monument's mixed- conifer forest (Kilgore 1972; Kilgore and Taylor 1979; Parsons and DeBenedetti 1979; Stephenson and others 1991; Caprio and Swetnam 1995; van Wagtendonk 1995; Skinner and Chang 1996; Mutch and Parsons 1998; Swetnam and others 1998; Miller and Urban 1999, 2000; Stephens. 2000, 2001; Caprio 2004) and high elevation forests and meadows (Vankat 1970; Kilgore 1971; DeBenedetti and Parsons 1984; Pitcher 1981, 1987; Caprio in press). While much is known from these studies, in many cases they have not provided the full level of detail necessary to completely understand natural fire regimes or the long- term effects of variable intensity fires on subtle ecosystem properties. This is especially true for the area of DEPO.

Research needs and priorities are jointly identified by the Division of Natural Resources and DEPO management staff. They are documented in the parks' *Natural and Cultural Resources Management Plan*. Such research may include in- house studies, interagency or cooperative agreements, contracts, or independent investigations. All fire- related research is closely coordinated with fire and fuels treatment operations and fire and fuels monitoring efforts in order to assure maximum application of findings to both the management and interpretation programs.

8. SAFETY

Fire Fighter Safety

Firefighting is an inherently dangerous operation that requires all personnel involved to exercise caution and judgment. The dangerous nature of this work does not allow any margin for error. If any fire or fuels management action cannot be carried out safely, another action must be utilized.

Prevention of injury or death is the overriding consideration during all operations. It is the responsibility of each and every person involved in an operation to ensure safety. At no time will the protection of resources be placed before the safety of fire management personnel. The Fire Management Office at Sequoia and Kings Canyon National Parks outlines safety policy in more detail in the *Fire and Aviation Management Operations Guide* (Addendum). National Park Service firefighters employed or working at the monument will adhere to safety procedures outlined in the above mentioned document.

In areas where firefighter safety mitigations are difficult or impossible to achieve, the monument may opt for less aggressive control strategies and accept fire spread over a greater number of acres.

Safety Committee

The Fire and Visitor Management division safety committee at SEKI will address safety issues pertaining to the monument's fire and fuels management activities. Members of this committee will include branch chiefs within the division including the fire management officer. This committee shall advocate that all operations be carried out in accordance with established safety practices as set by *Reference Manuals 18, 58, and 60*, the *Fireline Handbook* (NWCG 410-1), OSHA, the *SEKI Risk Management Plan*, policy, and the division safety plan.

The committee is not meant to replace the role of fire program managers and first line supervisors, but rather to expand the availability of safety information for firefighters. Program managers and first line supervisors are responsible for the establishment of Job Hazard Analyses (JHAs) which are written descriptions of hazards and corresponding mitigations for fire operations. Program managers will regularly review, modify, and update JHAs. Furthermore, the established JHAs will be readily accessible for crews so they may be able to integrate them into daily operations and projects. Currently, these JHAs are available on the SEKI computer network under *S:/Safety/JHA- 2*.

Wildland Fire Program

Due to many decades of fire suppression, unnatural fuel loads have accumulated in certain areas of the monument creating the potential for dangerous fires. National Park Service firefighters will only be allowed on an active wildland fire after receiving proper equipment and training as specified in *Reference Manual - 18*. This includes an annual eight- hour wildland firefighter

safety class. Inyo National Forest firefighters responding to monument fires will adhere to Interagency Fire Standards.

Furthermore, wildland firefighters must meet minimum physical standards for their assigned incident position, as defined in NWCG 310-1 “Wildland Qualifications Subsystem Guide.” Physical fitness/work capacity tests for wildland firefighters and other fire-qualified employees will consist of the “pack test.”

Per the 2004 Medical Standards, all permanent, subject-to-furlough, and term employees must complete a baseline medical exam. Those employees below age 45 must complete an annual medical exam every year and a periodic exam every five years. Employees above age 45 must complete an annual medical exam every year and a periodic exam every three years. Temporary employees below age 45 must complete an annual medical exam every year. Those over age 45 must complete an annual medical exam every year and a periodic exam every three years.

Public and Employee Safety

During fire operations or extreme fire danger, fire restrictions and emergency closures may be needed to ensure public safety. These restrictions can also reduce the possibility of human-caused fires during seasonal drought or extreme fire conditions. Emergency closures (i.e. trails in a fire area) may be declared by an Incident Commander to prevent imminent danger. Consultation with the monument site manager will occur as soon as possible. For longer term restrictions or closures (i.e. Stage 1, Stage 2 fire use restrictions), a special order will be issued by the Inyo National Forest through coordination with the monument and given wide distribution. For all restrictions and closures, signs will be posted and maintained in appropriate areas.

An evacuation plan will be in place and ready in the event of an unforeseen dangerous wildfire. When a fire threatens visitor or employee safety, monument personnel need to be given as much advance notice as possible in order to achieve orderly evacuation. The monument will develop an evacuation plan and keep it at the site manager’s office, so it can be activated when an emergency dictates the need. The evacuation procedures of monument residents will also be outlined in this plan.

During certain fire operations (such as prescribed fires), the parks may decide to keep trails open and allow visitors access to the fire area. If this happens, firefighters and interpreters on scene will answer questions and give safety messages to the public. Firefighters or other monument staff may also serve as escorts through fire areas. The monument will supply media representatives with personal protective equipment (PPE) when needed.

9. PUBLIC INFORMATION AND EDUCATION

Goals

Based on the ecological principles and operational procedures outlined in this *Fire and Fuels Management Plan*, the monument is committed to providing accurate and timely information for the public about unplanned fire incidents and planned projects.

Staffing

The Fire Information and Education Specialist at Sequoia & Kings Canyon National Parks (in this document referred to as the FIO) will assist with public outreach and will provide subject-matter expertise related to this field. Using some operational procedures outlined in *Standard Operating Procedures: Fire and Fuels Information* (Addendum), the FIO will ensure the consistency of messages and content.

Staff at the monument will serve a critical function in helping prepare for and notify appropriate target audiences about fire activities in cooperation with the FIO. For example, the interpretive program at the monument will develop stories for the public about fire ecology, fire history, and operations. The success of any fire information program depends on the cooperation and participation of many different partners.

When a large incident occurs in the parks beyond the ability of the staff to handle, the FIO will recruit personnel for specific duties or outside resources will be requested through dispatch procedures.

Target Audiences

The monument has identified four target audiences for fire information and education messages:

- Park Visitors** (including in- park visitors, internet visitors, and special groups)
- Park Employees** (including federal, non- profit, and volunteers)
- Local Communities** (including residents, businesses, civic groups, and clubs)
- Media** (including print, television, radio, and film)

Communication Methods

The following are examples of methods that can be used to communicate with the target audiences listed above. There are both personal and non- personal methods which will facilitate reaching the greatest number of people. The FIO and monument staff will continue to improve and expand this list.

Personal

- **Interpretive Programs** – Monument staff will integrate fire messages into hikes, walks, campfire programs, and special off- site presentations.

- **Employee Training** –Employee training sessions will be offered to improve staff understanding of the fire and fuels management program.
- **Roving** – During fire operations, park employees will be stationed in high- use visitor areas, including trails, to answer questions about the current activity and/or explain the fire and fuels management program.
- **Conference Presentations** – Monument staff or staff from SEKI will give peer presentations at conferences about current fire research, planning, or operations. These presentations will share information, generate feedback, and ultimately improve the fire and fuels management program.
- **Special Events** – The monument staff will, when possible, participate in local events to promote the fire and fuels program. For example, employees can staff booths at local fairs or host community meetings.
- **Public Meetings** – As needed, the monument will conduct special public meetings related to a specific fire event, planning effort, or to share general program information.
- **Media Interviews** – The FIO, or monument representative, will complete in- person or phone interviews for print, radio, and television outlets. When necessary, special media projects (books, documentaries, etc.) will be facilitated by guiding research, scheduling interviews with park staff, and coordinating filming schedules.

Non- Personal

- **Press Releases / Updates** – The FIO will use email, fax, and bulletin boards to distribute press releases / updates for all target audiences as needed.
- **Publications** – The monument will include fire and fuels information in regular publications such as newspapers and brochures.
- **Visitor Center Exhibits, Waysides, and Bulletin Boards** – The monument, with assistance from the FIO, will maintain and update the interpretive information in visitor centers and wayside exhibits on fire and fuels management.
- **Webpage** – The FIO will assist with the entry of information about monument projects and/or incidents on the national Fire and Aviation Management webpage called “Fire News.”

10. PROTECTION OF SENSITIVE VALUES

Sensitive resource values have the potential to be impacted by fire and fire management actions. However, mitigation efforts are designed to minimize those impacts and to prevent any possible resource impairment.

Cultural Resources

An archeological inventory of all of the land within the monument was written in 1993 (Hull and Hale 1993). The fieldwork was conducted in late 1992, shortly after the Rainbow Fire swept through approximately 85 percent of the monument's acreage. Surface visibility was optimal.

The Cultural Resources Specialist for Sequoia and Kings Canyon National Parks remains the key contact for Devils Postpile National Monument cultural resources concerns. Since the archeological resources in the monument have been located and documented, fire managers will be required to consult with the cultural resources specialist prior to implementing any ground disturbing activities such as those associated with staging areas and the cutting of fireline.

Fireline construction or any other ground disturbing activity planned for prescribed and mechanical fuel projects will be flagged in advance of any work on the ground, and must receive clearance and approval from the park archeologist prior to the work.

The cultural resources specialist will specify requirements necessary for the protection of significant resources within the project area which will be documented in each individual burn or mechanical fuel treatment plan. If any new, unrecorded archeological resources are uncovered during non-emergency fire operations, all work would immediately cease in the discovery area and the cultural resources specialist would be consulted.

For unwanted fires, the archeologist will be consulted as soon as practical to identify sensitive resources that have the potential to be affected by the fire or by fire management actions. To the extent possible – and considering short timeframes, unpredictable fire behavior, and firefighter and public safety – mitigation measures specified by the archeologist will be implemented as part of the suppression response.

Required mitigation in all cases may include but is not limited to: relocation of firelines away from sensitive sites, line construction to exclude sites, removal of fuels from sensitive sites to reduce fire intensity, installation of hoselays, sprinklers or other water handling devices for direct protection of features, and/or wrapping sites or features with fire protective shelter material. As new cultural resource requirements and standards for protection are developed, they will be adopted and included as an appendix in this document.

Assessing the condition of known resources before project implementation and after the project is complete will provide better information on effects on cultural resources, and feedback on the effectiveness of mitigation practices. These pre/post project inspections are considered part of the project and may be funded from project dollars. More detailed cultural resource monitoring information is included in Appendix C of the *SEKI Fire and Fuels Management Plan*.

Wilderness

Approximately 90% of the monument is designated wilderness. By NPS policy, areas proposed for wilderness are managed exactly the same as designated wilderness.

NPS Management Policy 6.3.9 directs that:

“Fire management activities conducted in wilderness areas will conform to the basic purposes of wilderness. The parks’ fire management and wilderness plans must identify and reconcile the natural and historic roles of fire in the wilderness, and will provide a prescription for response, if any, to natural and human- caused wildfires. If a prescribed fire program is implemented, these plans will also include the prescriptions and procedures under which the program will be conducted within wilderness. Actions taken to suppress wildland fire will use the minimum requirement concept and will be conducted in such a way as to protect natural and cultural resources and to minimize the lasting impacts of the suppression actions.”

NPS Director’s Order 4I, Wilderness Preservation and Management (DO- 4I, Section 5) further states that “under ideal conditions, natural fire should be considered as a fundamental component of the wilderness environment.”

In conformity with direction in NPS Management Policy 6.3.9 and NPS Director’s Order 4I, the natural and historic role of fire in the parks’ wilderness has been assessed and documented. In summary, lightning ignited fires have been found to be a natural process and primary driver of natural plant communities throughout the monument’s wilderness. Native American fire use has also been documented, with the influence of such use in shaping vegetation communities largely unknown.

All fire management activity in wilderness will be conducted according to minimum impact suppression guidelines found in SEKI’s *Fire and Aviation Management Operations Guide* (Addendum). Delegations of authority to incoming fire management teams will require that minimum impact suppression techniques be followed (see delegation example in Appendix F).

The use of chainsaws, portable pumps, and the landing of helicopters, for all fire operations will be considered appropriate as the minimum tool, as will electronic devices including but not limited to global positioning units for mapping and locating fires, and cell phones and portable radios for communications.

When using helicopters, the monument will consider operational periods, amount of flight time, and sensitivity of travel routes. When using stock, the monument will adhere to existing regulations including party size restrictions and forage area regulations, and will consider the implications of competing for limited forage in relation to private and commercial stock users. Use of both stock and aircraft will be kept to the minimum necessary commensurate with meeting project objectives and providing for firefighter safety.

Burned area emergency rehabilitation plans may be implemented under the direction of a resource advisor following significant fire management actions. Emergency rehabilitation in wilderness will seek to restore areas impacted by fire operations in ways that will restore and preserve wilderness character and conditions. Actions implemented under emergency conditions as part of immediate suppression and stabilization generally do not require pre-approval. Proposals for long term recovery actions will be submitted to the SEKI Environmental Management Committee (EMC), which will recommend and enforce the appropriate level of environmental compliance prior to implementation.

Fire- related research and monitoring may occur to document and understand the effects of fire management actions in wilderness. Research and monitoring staff and equipment will create additional transient (short- term, infrequent) impacts. Any proposal that required the installation of long term or permanent research or monitoring equipment in the wilderness will require a separate analysis and approval by the SEKI Environmental Management Committee.

Soils

Prescriptions designed to reduce fire severity during prescribed fire operations will be followed. Existing roads and trails will be used to the greatest extent possible as control lines for both wildland and prescribed fires.

Tactics involving the use of handtools which minimize the impacts to soil will be employed to construct firelines, where appropriate. Fire management personnel will rehabilitate firelines after completing the operation to reduce soil loss through erosion.

Air Quality

Several methods are available to reduce the impacts to air quality including (1) minimizing the area burned, (2) reducing the fuel loading in the area to be burned through mechanical pretreatment, (3) reducing the amount of fuel consumed by fire through the use of smaller burn units, and (4) minimizing emissions per ton of fuel consumed by burning under favorable conditions or using different firing techniques.

Prescribed burns will not be conducted under conditions where ambient levels of ozone are already determined to be unhealthy. Prescriptive elements in prescribed burn plans will specify the proper conditions necessary to increase smoke dispersal and enhance burning, thereby reducing impacts from smoke.

Under the Clean Air Act, the monument is responsible for protecting air quality within its boundaries. The monument must also take appropriate action to do so, when reviewing emission sources both within and in proximity to the monument (Malkin 1994, Clean Air Act, as amended). Therefore, all prescribed burns will be conducted in accordance with regulations established by the State of California and the Clean Air Act and the Smoke Management Plan (Appendix C).

Water Quality

In addition to the measures identified in the soils section, whenever possible, vegetation adjacent to streams and other water courses will be protected. The vegetation should sufficiently slow the flow of any run-off to permit debris and soil to be deposited before it could reach a stream or river. Site specific mitigation measures will be included in prescribed burn plans when appropriate. Activities will be coordinated with neighboring landowners and agencies to avoid impacting a specific watershed.

All riparian areas, including wild and scenic rivers, will be protected from contamination by fire fighting foams and aerial retardant following guidelines in the *Fire and Aviation Management Operations Guide* (FAMOG). Minimum impact suppression techniques detailed in the FAMOG will be used in the monument and are especially critical to apply in wild and scenic river corridors. Chemical fire retardant will be used sparingly and with maximum regard for aquatic life. Retardant use will be highly discouraged near significant streams, especially the Middle Fork of the San Joaquin River.

Aquatic resources

All riparian areas, including wild and scenic rivers, will be protected from contamination by fire fighting foams and aerial retardant following guidelines in the *Fire and Aviation Management Operations Guide* (FAMOG). Minimum Impact Suppression Techniques (MIST) detailed in the FAMOG will be used in the monument and are especially critical to apply in Wild and Scenic River corridors.

Vegetation

Prescribed burning has direct and indirect effects on the environment. Proper use of prescribed fire and evaluation of the benefits and costs of a burn require knowledge of the manner in which fire affects vegetation. Prescribed burns will be implemented with appropriate consideration given to the historical role of fire and the potential impacts of its reintroduction to a given biotic (or plant) community. The intensity and frequency of fire in a given plant community will be controlled to meet resource objectives. Prescribed burns will be timed to achieve maximum benefits to a target species or biotic community and minimize adverse environmental effects.

Wildlife

Care will be taken to avoid burning during sensitive periods, for example, prior to fledging of ground nesting birds. Additional protection will be afforded to sensitive species (see Special Status Species).

Special Status Species

Known locations of sensitive species will be considered during wildland fire suppression operations unless it is known that fire enhances a particular species. All known listed species in a burn unit will be evaluated prior to a prescribed burn and protected as specified in the

prescribed burn plan. All such measures will be identified in prescribed burn plans and in a site-specific, pre- attack wildland fire suppression plan.

Invasive Non-native Plants

There is a risk that prescribed fire will cause the establishment and spread of invasive plants. The risk can be minimized by managing the location and timing of fires and the presence of seed sources. Because bull thistle is more widespread in the monument, absolute avoidance may not be possible. However, planned fire locations will be compared with known bull thistle locations so that pre- and post- fire invasive plant control could be administered to affected burn units. The risk that the close proximity of stock to a prescribed burn unit will provide a source of non-native plant seed will be minimized by the use of California certified weed- free feed by the Reds Meadow Pack Station. Region 5 of the U.S. Forest Service, which includes Inyo National Forest, is in the process of drawing up regulations to require use of California certified weed- free feed by all users and pack stations (Nelson 2003).

Scenery and Recreation

When, during wildland fire suppression operations and prescribed fire operations, administrative closure of an area is necessary to provide for visitor protection, all affected trailheads will be signed so that closures will be easily recognized. Safety measures to ensure visitor safety include posting traffic warning signs and public notices and will be identified in the prescribed burn plan. Interpretative programs will be presented, when appropriate, to better inform the public of the role of fire in the ecosystem and explain the ways in which fire can be used to accomplish management objectives. The monument will work with adjacent landowners and the Forest Service to coordinate activities so that the visiting public will be impacted as little as possible.

Gateway Communities

Interpretative programs will be presented, when appropriate, to better inform the public of the role of fire in the ecosystem and the ways in which fire can be used to accomplish management objectives. The monument will work with the Forest Service to coordinate activities so that the gateway communities will be impacted as little as possible.

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Appendices

A) Five-Year Fuels Treatment Plan

Table A-1 – Five-Year Fuels Treatment Plan

FMU	Year	Project Name	Type of Treatment	Acres	Notes
Fiscal Year 2005					
DEPO	FY05	DEPO Thinning	Mechanical	10	This is phase one of a mechanical project around the developed area within Devils Postpile National Monument.
DEPO	FY05	DEPO Hand Pile	Mechanical	10	This is phase two of the mechanical project around the developed area within Devils Postpile National Monument.
Fiscal Year 2006					
DEPO	FY06	DEPO Pile Burn	Fire	10	This is to burn the piles created by the FY05 mechanical project around the Devils Postpile developed area.
DEPO	FY06	Prescribed burn planning	Fire	TBA	This is to plan an interagency (NPS, USFS) prescribed burn adjacent to the developed area within Devils Postpile National Monument.
Fiscal Year 2007					
DEPO	FY07	Prescribed burn	Fire	TBA	This is to execute a prescribed burn adjacent to the developed area within Devils Postpile National Monument.
Fiscal Year 2008 – Nothing planned					
Fiscal Year 2009 – Nothing planned					

B) Wildland Fire & Fuels Reporting Requirements

Burn Boss Responsibilities

Burn Bosses are responsible for the completion of Burn Unit Plans, Unit Logs, Individual Fire Reports (DI- 1202), and performance ratings. Cost tracking forms and Post Burn Reports are no longer required. Burn Bosses need to make sure that unit preparation and execution support is coordinated with the monument site manager and the Kings Canyon District FMO, and that adequate documentation is provided to Fire Dispatch during burn unit execution. Burn Bosses will provide daily fire situation updates to Fire Dispatch by telephone, fax, or email.

Burn Unit Plan – One plan should be written for all “active” segments within a unit – this saves on duplication of effort and time spent getting the document reviewed and approved. The plan is good until all segments are executed or there are major changes in unit/segment planning. The Burn Boss has the final say on control line location. For short duration burns the current prescriptions are valid. A burn plan form is available on the SEKI network under J:/share_docs/plans/fire/burn_plans.

Unit Log – For use in tracking decision and significant actions/events during execution. Attach originals to Individual Fire Report and send to FMO.

Individual Fire Report – For NPS reporting purposes, geographically distinct segments within a unit need to be documented on separate Individual Fire Reports.

- Thorough Individual Fire Reports take the place of Post Burn Reports.
- Provide a chronological, detailed narrative of events and decisions.
- Use the monitoring data collected to compare what actually happened on the fire to burn unit objectives. Describe, based on monitoring data and experience, how the fire met objectives. If objectives were not met, explain the problems encountered that prevented meeting objectives.
- Attach 7.5 minute maps showing daily fire spread or ignition information, and final fire perimeter.
- Unit Log originals should be included with Individual Fire Reports and sent directly to Fire Dispatch within 10 days after declaring the fire out.

Trainee Performance Ratings – Burn Bosses are responsible for completion of Individual Performance Ratings (ICS Form 226) or Task Books for trainees. Task Books are initiated through coordination with FMO.

Fire Monitor Responsibilities

Fire Monitors – Fire monitor reports with lengthy narratives are no longer required by FMO. Summaries used for programmatic analysis by FMO will be initiated at Resource Management Office discretion. Fire Monitors need to gather thorough observation information and ensure that forms and maps are prepared for all prescribed fire incidents they are assigned to (see list below). If designated Fire Monitors are not assigned to a burn unit then it is the Burn Boss’ responsibility to thoroughly document burn unit execution using the same forms. Monitors need to provide copies of all forms to Burn Bosses within a timely manner. All original forms and maps are sent to Fire Dispatch for inclusion in the fire files.

Fire Effects Monitors – Fire effects monitoring protocols are supervised by the park fire ecologist. Plot records remain with the ecologist. FMO works with the ecologist to archive fire effects records.

Smoke and Weather Monitoring Technician – The Smoke and Weather Monitoring Technician compiles data from various observation sensors, archives the data and compiles hard copies into data packages for several prescribed fire operations each fire season.

List of Monitoring Forms (items 1- 5 available from FMO)

1. Dead Fuel Moisture Determination
2. Live Fuel Moisture Determination
3. Fire Weather and Fire Behavior Observations
4. Smoke Observations
5. Wildland Fire Observations Record
6. Maps showing daily fire spread or ignition, and including locations of fire observations.

Fire Dispatch Responsibilities

Fire Dispatch is responsible for compiling fire planning documents, situation and observation data into individual fire files, and document fire situation information using the form: Interagency Report of Incident and Dispatch Action. Fire Dispatch also maintains daily fire situation information in several interagency computer systems.

Fire Information Officer Responsibilities

The Fire Information Officer is responsible for compiling media releases and news articles and maintaining a documentation file. The FIO also coordinates communications about monument fire operations with employees through use of email systems.

Reports

The Fire Management Office is responsible for the completion of the following:

1. Annual prescribed fire accomplishment reports into the NPS Wildland Fire Management Computer System (WFMCS)
2. Entering Individual Fire Reports in WFMCS
3. Annual SEKI Fire Summary
4. Annual SEKI Air Operations Summary
5. Entering all required reporting data into the National Fire Plan Operations Reporting System (NFPORS).

Archives

The SEKI archaeologist supervises the archiving of individual fire files and other important fire history documents from the monument into SEKI archives. FMO staff prepares the files following the archaeologist's direction.

C) Smoke Management Plan

Summary

This *Smoke Management Plan* provides guidelines for monument management of smoke from wildland fires. It addresses all requirements set by the San Joaquin Valley Unified Air Pollution Control District (hereinafter called the District).

The Monument is within the San Joaquin Valley air basin. The basin is classified as serious non-attainment for two criteria pollutants (particulate matter [PM- 10] and ozone) as defined by the Federal Clean Air Act. This smoke management plan concentrates upon PM- 10 as the most significant pollutant produced by wildland fire thereby serving as a marker for other criteria pollutants.

Under the Clean Air Act and the California Air Resources Board (CARB) the District is required to implement Best Available Control Measures (BACM) in order to meet established deadlines set for complying with PM- 10 National Ambient Air Quality Standards (NAAQS). BACM is implemented in the air basin by requiring the monument's fire program, and other burners within the air basin, to comply with a series of emission control measures that are some of the most stringent in the nation.

The District has developed its own *Smoke Management Plan* for regulating prescribed fires. The monument *Smoke Management Plan* implements the District plan. In addition, the District has two specific rules pertaining to prescribed fires, Rule 3160 (Prescribed Burning Fee) and Rule 4106 (Prescribed Burning and Hazard Reduction Burning). This *Smoke Management Plan* responds to District procedures and rules contained in their plan. The dynamic nature of air resource management may require annual adjustment to this *Smoke Management Plan*.

The monument is part of an interagency group of wildland fire burners (federal, state, and private). Burners (DEPO is represented by SEKI) and the District meet quarterly to discuss and seek improvement to basin air quality through improvements in fuels management and associated effects to the air resource. As a group member, SEKI adheres to all District rules described above plus actively pursues completion of a Memorandum of Understanding (MOU) between the District and the eight state and federal agencies that conduct prescribed burning or manage fire use projects within the air basin. The MOU will establish a cooperative relationship between the wildland burners and provide a framework to interact with the District on air quality issues.

By carefully managing the timing and location of smoke emissions the monument can meet goals in the *Fire and Fuels Management Plan* and the District's plan. As natural areas are treated and maintained with prescribed fire and mechanical treatments, the potential amount of smoke emissions will be reduced. Smoke emissions that will otherwise be released during unwanted wildland fire events with accompanying severe smoke impacts to smoke sensitive areas (SSAs), potential harm to life and property, and unnatural alteration of ecosystems will be reduced.

Introduction to the Smoke Management Plan

Smoke behavior, and corresponding impacts, is a complex issue involving a number of elements:

- Fuel reduction techniques prior to or instead of burning as a means of emission reduction.
- Amount of fuel loading that will burn – Restoration areas have the highest fuel loading, including duff, which mostly burns in the smoldering phase. Maintenance areas have less fuel per acre than restoration areas (including duff loading) leading to a shorter, more discontinuous smoldering phase.
- Location, amount and duration of smoke emissions.
- Type of fire situation and controllability – Prescribed burn operations are generally controllable and predictable. Generally, large unwanted suppression fires are more uncontrollable and less predictable.
- Time of year smoke is produced – Summer conditions often provide the best southwesterly flow and lift for smoke but ozone levels are higher. Spring conditions provide weather events to disperse smoke but fuels are often too wet to burn. Fall conditions provide an excellent window for fuel and fire manageability but weather conditions often do not yield good smoke dispersal conditions.
- Behavior of the smoke plume, which is dependent on elevation and dynamic meteorological conditions – Direction and elevation the plume moves and resulting impacts at ground level to people, and impacts to sensitive airsheds, such as wilderness.
- Interaction of smoke from monument fires with pollution sources in the San Joaquin valley (including other fires in the area).

This plan will be used to provide direction for the monument smoke management program. The plan directly parallels BACM as mandated by the EPA, CARB, and the District. The plan is based on smoke management principals provided by the national fire management training Smoke Management Techniques, RX- 410. Written and verbal procedures that implement this plan will be revised continually as new or better methods become available, along with adjustments in staffing and support needs.

The purpose of the program is to serve the goals and objectives of the monument *Fire and Fuels Management Plan* while, at the same time, serve the requirements of the Federal Clean Air Act as enforced by CARB through the District. The District was declared a serious non- attainment area for PM₁₀ in 1993. SEKI fire staff, along with representatives from several land management agencies, worked closely with the District in development of the 1994 Serious Non- attainment Area PM₁₀ Plan. The PM₁₀ Plan called for the implementation of BACM for particulates via an earlier MOU and accompanying work plan signed by SEKI in 1997.

In 1999, revision to CARB Title 17 forced required changes in District rules. Rule 3160 and 4106, as well as the District *Smoke Management Plan*, arose due to the new Title 17 direction. Rule 3160 describes procedures for assessing fees against acres treated with fire in order to fund District meteorologists and enforcement staff for prescribed fire regulation. Rule 4106 details regulations for permitting, regulating, and coordinating prescribed fire within the District area. The District then declared the 1997 MOU and its work plan void following the rule revisions in 2001. Wildland burners in the air basin subsequently restated their desire to revisit and recreate an MOU as a method to insure coordination amongst burners with the District. That MOU is

now in development. Upon completion, it will become an Addendum to the monument's *Fire and Fuels Management Plan*.

Much of this *Smoke Management Plan* details smoke management techniques and administrative procedures. It is recognized that there exists a large amount of potential smoke emissions within the District due to the past 100 years of land management practices in natural areas. Where lands remain far outside the normal fire regime, unnatural ecosystem structure and processes predominate leading to high fuel accumulations and continuous canopies of vegetation. District staff recognizes that these conditions exist and that they require attention. This plan and District rules and regulations are meant to balance ecosystem needs and air resource needs in order to stabilize ecosystems and reduce the amount of potential emissions over a multi- decade period of time.

Prescribed Fire

Planning: What do we do?

- **Annually identify areas** that need prescribed fire and/or mechanical treatments by evaluating values, hazards, and risks for the monument.
- **Select treatment priorities** based upon the analysis of the values, hazards, and risks. Consider managerial capabilities to accomplish treatments given practical limitations in planning, finance, operations, and logistical support.
- **Write the annual fuels treatment plan** that describes the program for the upcoming field season including descriptions of individual treatment preparation and execution needs. Insert this annual plan into a revised *5- Year Fuels Treatment Plan*.
- **Submit the annual fuels treatment plan to the District for review.** Note that air quality regulations and requirements are dynamic and subject to change. The process described below is in effect at the time of this document's publication. Updated procedures and requirements enacted after the approval date of this plan will be incorporated in annual updates to the *Fire and Fuels Management Plan*. While the District does not have authority to approve or reject this overall *Fuels Treatment Plan*, it does provide input to the individual prescribed fire burn plan. Air quality concerns remain the major issue affecting prescribed fire treatment.
- **Submit the burn plan to the District for review under Rule 4106.** The Air District has up to 30 days to review individual burn plans. They are required to inform the monument of concurrence or to request changes at the end of the 30- day period. Burn plans will describe the smoke management parameters necessary to provide optimum smoke dispersal based on burn goals and objectives, location, fuel loading and predicted fuels consumption, length of ignition and burn down, and proximity to SSAs. Burn plan contingencies will also include a description of the decision process management will take to limit smoke impacts if smoke conditions deteriorate in SSAs and the coordination requirements with the District. Minimum safe roadway visibility is described and the mechanism for maintaining safe use of the roads is explained in detail.

- **Complete the District smoke management summary and submit with the burn plan.** The District uses their smoke management summary to permit burns. The smoke management summary for the burn can reference the burn plan. Smoke management summaries will also describe alternatives considered in lieu of burning and earlier treatments employed which have all ready reduced potential emissions. Discussion will provide why alternatives were rejected and how earlier treatments have provided mitigation for current burning.
- **Request pre- ignition forecast.** At a minimum seven days prior to the earliest ignition date, a request will be submitted to the District to begin long- range smoke dispersal forecasting for the proposed ignition (PIFA forecasts). The District will provide 96- , 72- , and 48- hour outlooks, and 24- hour forecasts on days leading up to the proposed ignition date. The District retains final go/no- go authority until the time of ignition.

Project Implementation: What do we do?

- **Monitor weather and fuels** against prescriptive criteria. Prescribed burns are ignited when weather conditions are favorable for dispersing smoke away from SSAs, or during conditions that dilute smoke so that impacts to SSAs do not exceed health standards. This will be accomplished by utilizing the most current and comprehensive weather forecasting information available for predicting smoke transport direction and concentration down wind. Fuel moisture is also a high priority prescription element that will be monitored pre- burn. Fuel moisture prescriptions are designed to provide the optimum balance between the need to moderate fire behavior, minimize undesired fire effects on other resource values, and minimize smoke production (drier fuels burn cleaner and produce less pollutants). Fuel moisture information will be obtained and analyzed pre- burn for all significant categories of fuels (litter/duff, 1- , 10- , 100- and 1000- hour fuels) to ensure conformity with the prescription.
- **Obtain superintendent go/no go decision** on ignition.
- **Seek concurrence from the Air District** to proceed with ignition.
- **Notify the public** about the ignition.
- **Hold briefing** and review burn plan operations with burn staff.
- **Ignite a test- fire.**
- **Make final go/no go decision on ignition** (burn boss and associates).
- **Ignition occurs.** Fire management staff will proactively regulate the number of acres burned each day. Two factors are of critical importance: emissions produced per day and duration of smoke produced. For prescribed fire treatments of forested areas near SSAs, acreage treated in restoration burns may be limited to about 50 acres per day, with twice that acreage for maintenance treatments. This limit serves only as a guide with acreage treated varying due to terrain, proximity to SSAs, fuel conditions (i.e. loading, dryness, and fuel model),

meteorological conditions, etc. Duration of smoke produced from fires will vary with the fuel type. Timber fires, due to fuel loading inclusive of duff, burn for the longest time periods. With half the duff present on most maintenance burns, duration is significantly reduced. Again, as a general rule, smoke production near SSAs should be kept to less than five days before significant reduction in particulate load production occurs.

- **Monitoring of meteorology and air quality conditions will begin prior to ignition and follow through ignition completion and burn down of remaining available fuels.** Qualified fire personnel will conduct all smoke monitoring. Personnel will monitor smoke impacts to SSAs and transmit that information to the burn boss to utilize the intelligence gathered to adapt burn execution to avoid unhealthful smoke impacts. This will be accomplished by visual observations on small fires, short duration fires (e.g. grass fires) and on remote wilderness fires. On fires in close proximity to SSAs, that may be of long duration or possess heavy fuel loading, monitoring will include equipment to measure particulate load production, collect 24 hour weather data, and document visibility conditions through photography.
- **Dispersion Intelligence.** Smoke dispersion potential (the capacity of the atmosphere to absorb and disperse smoke) is carefully evaluated prior to a burn being ignited and during unit execution. Several methods can be utilized:
 - Monument personnel operate one weather station. The weather data collected provides fire staff with current information used in fire operations planning.
 - Standard National Weather Service fire weather forecasts are reviewed for favorable dispersal winds aloft. Generally, ridge winds from the west at 10 to 15 mph are desirable.
 - Data provided by various internet sources provide detailed information on regional weather trends.
 - Pre- fire spot weather forecasts provided by the Weather Service provide detailed smoke dispersal information. Predicted unstable atmospheric conditions are optimal, although fire managers must weigh instability against the ability of fire behavior to become erratic and escape.
 - The District's meteorologists provide additional dispersal information for burns at all elevations.
 - Release of PIBAL balloons may be used to determine surface and low level wind speed and direction before and during burn ignition and burn down.
 - The SEKI contract helicopter can be used to assess the atmospheric adiabatic lapse rate before and during burn unit execution- - which helps with interpreting the capacity of the atmosphere to disperse smoke. Helicopter crew members also conduct visual observations of burn unit smoke dispersal and record the observations.
 - Significant test fires will be conducted prior to unit ignition to determine that burning goals and objectives will be met, and that smoke dispersion occurs as predicted in the burn plan.

Post- fire: What do we do?

- **Assemble monitoring data** as part of the final fire package.

- For fires larger than 250 acres, complete District smoke management summary post fire report.
- By June 30 of following year, pay District \$5.00/acre for all black acres produced on burn.

Staffing Needs and Responsibilities

The Kings Canyon District FMO is responsible for the implementation of the annual fuels treatment program within the monument. Working with the SEKI fuels specialist, the district fire management officer will assign burn bosses to individual burn units, who must ensure appropriate staff is assigned to each burn. The district fire management officer will ensure coordination occurs between the District and the burn boss. Fire and aviation dispatch will track all PIFA and spot fire weather forecasts, and serve as an information gatekeeper when burn bosses are assigned and unavailable for telephone conversations with District enforcement staff. The SEKI fuels specialists will act as the check in the system ensuring coordination at the burn plan/smoke management plan phase, execution phase, and post- fire stage occurs.

Documentation and Cost Tracking

The fire folder will contain copies of all documents as outlined in Appendix B (Wildland and Fuels Management Reporting Requirements). The folder will include: all planning documents (burn plan and any amendments, smoke management summary, incident action plans), monitoring data and summary reports, fire time reports, maps, photos, and DI- 1202. All expenditures will be tracked and reported according to the standards established in the Department of the Interior Individual Fire Occurrence Form (DI- 1202). It is the responsibility of the district fire management officer, or his/her burn boss, to ensure fire report completion. Acres blackened rather than fire perimeter will be used to assess District Burn fees.

D) Minimum Impact Suppression Tactics

Safety

- Apply principles of LCES to all planned actions.
- Constantly review and apply the 18 Watch Out Situations and 10 Standard Fire Orders.

Escape Routes and Safety Zones

- In any situation, the best escape routes and safety zones are those that already exist. Identifying natural openings, existing roads and trails and taking advantage of safe black will always be a preferred tactic compatible with MIST. If safety zones must be created, follow guidelines similar to those for helispot construction.
- Constructed escape routes and safety zones in heavier fuels will have a greater impact, be more time consuming, labor intensive and ultimately less safe.

Fireline Construction

Ground Fuels

- Use cold- trail, wet line or combination when appropriate. If constructed fireline is necessary, use minimum width and depth to stop fire spread.
- Minimize bucking to establish fireline. Preferably move or roll downed material out of the intended constructed fireline area. If moving or rolling out is not possible, or the downed log/bole is already on fire, build line around it and let the material be consumed.

Aerial fuels—brush, trees, and snags

- Adjacent to the firelines limb only enough to prevent additional fire spread.
- Inside the firelines remove or limb only those fuels which will have potential to spread fire outside the fireline.
- Cut brush or small trees necessary for fireline construction flush to the ground.
- Trees, burned trees, and snags:
 - o Minimize cutting.
 - o Do not cut live trees unless it is determined they will cause fire spread across the fireline or seriously endanger workers. Cut stumps flush with the ground, do not cross- hatch.
 - o Identify hazard trees with flagging, glowsticks, or a lookout.

Mopup Phase

- Minimize bucking of logs to check for hot spots or to extinguish fire. Preferably roll the logs and extinguish the fire.
- Consider allowing larger logs near the fireline to burn out instead of bucking.
- Aerial fuels (brush, small trees, and limbs): remove or limb only those fuels which if ignited have potential to spread fire outside the fireline.
- Burning trees and snags: The first consideration is to allow a burning tree/snag to burn itself out or down.

Helispot Planning

- Consider using long- line remote hook in lieu of constructing a helispot.
- Consult Resource Advisors in the selection and construction of helispots during incident planning.

- Estimate the amount and type of use a helispot will receive and adapt features as needed.
- Balance aircraft size and efficiency against the impacts of helispot construction.
- Use natural openings as much as possible. If tree felling is necessary, avoid high visitor use locations unless the modifications can be rehabilitated. Fall, buck, and limb only what is necessary to achieve a safe and practical operating space.

Non- Native Plants

- Prevent equipment used for constructing fireline from introducing non- native invasive plant species. Before equipment is brought into the park, it should be pressure or steam washed in order to remove seed- containing soil or plant propagates.
- Inspect boots and field equipment for soil, seed, and plant parts before entering the park. Remove material and dispose in bagged garbage.
- Locate fireline well away from patches of non- native invasive plant species whenever possible.

Wilderness Ethics

"Wilderness" is both a legislated area and a state of mind. Preservation of Wilderness values for all users requires your personal commitment. All party members are responsible for following these regulations:

Campsite Guidelines

- **Camp at least 100' from water** where terrain permits. Campsites must always be at least 25 feet from water.
- Camp on bare ground, never on vegetation or in meadows.
- Do not construct rock walls, trenches, bough beds, etc.
- Camping near trails will enable stock support. Near a helispot will enable aviation support.
- Good campsites are found, not made. Put some effort into looking for a good campsite.
- Personal Sanitation:
 - o Designate a common area for personnel to wash up. Provide fresh water and biodegradable soap.
 - o Do not introduce soap, shampoo or other chemicals into waterways.
 - o Dispose of wastewater at least 200 feet from water sources.
 - o Toilet sites should be located a minimum of 200 feet from water sources. Holes should be dug 6- 8 inches deep.
 - o If more than 1 crew is camped at a site strongly consider portable toilets and remove waste.
- Do not let garbage and food scraps accumulate in camp.
- Treat or filter all drinking water.

Campfires

- Use existing fire rings. Try not to build new rings or add rocks to existing fire rings.
- Do not burn plastics or metal.

Food Storage and Bears

When bears obtain human food and garbage, they can become destructive or aggressive, and may be killed as a result. It is your responsibility to prevent bears from obtaining your food. All scented items (food, soap, sunscreen, repellent, garbage, toothpaste, lotion) must be stored properly at all times. Proper storage methods include bear- proof canisters (recommended as the best option), metal food storage boxes, and using the counter- balance technique to hang your scented items.

E) Template for Prescribed Fire Burn Plan and Mechanical Treatment Plan

USDI National Park Service
Sequoia and Kings Canyon National Parks

Prescribed Burn Plan

BURN NAME

Prepared by: _____ Date: _____

Technical Reviewer: _____ Date: _____

Recommended by: _____ Date: _____
District Fire Management Officer

Recommended by: _____ Date: _____
Park Fire Management Officer

Recommended by: _____ Date: _____
Chief Ranger

Recommended by: _____ Date: _____
Environmental Specialist

Recommended by: _____ Date: _____
Chief, Science and Resources Management

Recommended by: _____ Date: _____
Chief, Cultural Resources and Interpretation

Approved by: _____ Date: _____
Park Superintendent

For information about this burn unit contact:
Fire Management Office 559- 565- 3164/3165
FAX 559- 565- 3797
24 Hour Park Dispatch 559- 565- 3341

Executive Summary

Goals and Objectives

Goal #1 –

Objective -

Burn Unit Description

A. General Area Description:

B. Location:

County –

Range , Township , section

UTM Zone , Easting , Northing (approximate mid point of the segment)

Longitude, Latitude (approximate mid point of the segment)

C. Fire Management Zone , Area , Unit (1984 and 1992 FMP revision)

D. Size:

E. Elevation Range:

F. Slope Range:

G. Aspect Range:

H. Description of Holding Boundaries:

I. Designated / Proposed / Recommended Wilderness? yes no

J. Vegetation Type and Fuel Loading Description:

Vegetation Includes:

Vegetation Type	Fuel Model NFFL	Estimated Acres	Estimated Tons Per Acre

Total Estimated Project Tons:

J. Project Maps - Vicinity, Project, Fuels and Vegetation Maps are attached

Project Complexity

A. Hot End:

B. Cool End:

Burn Organization

A. Hot End

- Prescribed Burn Boss:
- Safety Officer:
- Fire Information Officer:
- Lead Prescribed Fire Monitor:
- Prescribed Fire Ignition Specialist:
- Firing Team:
- Holding Supervision:
- Ignition/Holding Crews/Equipment:
- Slopover Containment Worksheet Resource Needs:

B. Cool End

- Prescribed Burn Boss:
- Safety Officer:
- Fire Information Officer:
- Lead Prescribed Fire Monitor:
- Prescribed Fire Ignition Specialist:
- Firing Team:
- Holding Supervision:
- Ignition/Holding Crews/Equipment:
- Slopover Containment Worksheet Resource Needs:

Estimated Costs

Item	Planning	Preparation	Execution	Evaluation
Personnel				
Equipment (mileage, rental)				
Aircraft				
Supplies (non-rolling stock)				
Phase Costs				

Total Estimated Cost: (does not include base 8 salary paid out of non- project accounts).

Estimated Cost Per Acre:

Scheduling

A. Hot End

- Proposed Ignition Period:
- Expected Burn Duration:
- Note any dates when the burn may not be run during the proposed window:

B. Cool End

- Proposed Ignition Period:
- Expected Burn Duration:
- Note any dates when the burn may not be run during the proposed window:

Pre-Burn Planning and Preparation Considerations

A. On Site: (for logistics, ensure discussion of minimum requirement / minimum tool):

B. Off site:

Burning Prescription

Fuel Model NFFL 1 - annual grass *

Head Fire

Environmental Conditions

Air Temperature: 30- 90 F

Relative Humidity: 20- 60%

Wind Speed (midflame - MFWS) see combinations with fine fuel moisture below

Slope: 0- 30%

1- Hour Time Lag: 5- 10% (MFWS 0- 2)

10- Hour Time Lag: N/A

100- Hour Time Lag: N/A

1000- Hour Time Lag: N/A

Live: N/A

Fire Behavior Outputs

Scorch Height: N/A

Rate of Spread: 2- 35 chains per hour

Flame Length: 0- 4 ft.

Heat per Unit Area: 55- 95 BTU per square foot

Fireline Intensity: 3- 60 BTU per foot per second

Prescribed Head Fire Matrix for Flame Length (feet) / Rate Of Spread (Chains/hour)			
1 Hour Fuel Moisture	5%	7%	9%
MFWS = 0	2.3 / 20.8	2.2 / 18.6	1.8 / 14.7
MFWS = 1	2.5 / 24.2	2.3 / 21.6	1.9 / 17.1
MFWS = 2	2.9 / 35.0	2.7 / 31.2	2.3 / 24.7

Backing Fire (wind upslope)

Environmental Conditions

Air Temperature: 30- 90 F

Relative Humidity: 20- 60

Wind Speed: (midflame - MFWS) see combinations with fine fuel moisture below

Slope: 0- 100%

1- Hour Time Lag: 3- 4% (MFWS 0- 4) / 5- 10% (MFWS 0- 2)

10- Hour Time Lag: N/A

100- Hour Time Lag: N/A

1000- Hour Time Lag: N/A

Live: N/A

Fire Behavior Outputs

Scorch Height: N/A

Rate of Spread: 2- 8 chains per hour

Flame Length: .5- 2'

Heat per Unit Area: 100- 110 BTU per square foot

Fireline Intensity: 4- 15 BTU per foot per second

These are generalized prescription parameters. The burn boss is responsible for addressing topographic features outside the range listed in order to meet their burn objectives (usually accomplished by varying the firing pattern, sequence and rate of ignition).

Burning Prescription

Fuel Model NFFL 2 - grass with overstory *

Head Fire

Environmental Conditions

Air Temperature: 30- 90 F

Relative Humidity: 20- 60%

Wind Speed (midflame - MFWS) see combinations with fine fuel moisture below

Slope: 0- 30%

1- Hour Time Lag: 6- 11% (MFWS 0- 2) / 12- 13% (MFWS 0- 6)

10- Hour Time Lag: 7- 12% (MFWS 0- 2) / 13- 14% (MFWS 0- 6) / 15- 16% (MFWS 0- 10)

100- Hour Time Lag: 8- 13% (MFWS 0- 2) / 14- 15% (MFWS 0- 6) / 16- 17% (MFWS 0- 10)

1000- Hour Time Lag: N/A

Live Foliage Moisture: 50- 100%

Fire Behavior Outputs

Scorch Height: 0- 30'

Rate of Spread: 1- 16 chains per hour

Flame Length: .5- 4 ft.

Heat per Unit Area: 255- 495 BTU per square foot

Fireline Intensity: 4- 145 BTU per foot per second

Prescribed Head Fire Matrix for Flame Length (feet) / Rate Of Spread (Chains/hour)			
1 Hour Fuel Moisture	6%	9%	12%
MFWS = 0	3.3 / 8.7	3.1 / 7.6	2.4 / 5.5
MFWS = 2	4.4 / 16.1	4.1 / 14.1	3.1 / 10.2
MFWS = 6	*8.4 / 64.0	*7.7 / 55.8	*5.9 / 40.4

* Out of prescription

Backing Fire (wind upslope)

Environmental Conditions

Air Temperature: 30- 90 F

Relative Humidity: 20- 60%

Wind Speed: (midflame - MFWS) see combinations with fine fuel moisture below

Slope: 0- 100%

1- Hour Time Lag: 4- 9% (MFWS 0- 4) / 10- 13% (MFWS 0- 2)

10- Hour Time Lag: 5- 10% (MFWS 0- 4) / 11- 14 (MFWS 0- 2)

100- Hour Time Lag: 6- 11% (MFWS 0- 4) / 12- 15% (MFWS 0- 2)

1000- Hour Time Lag: N/A

Live Foliage Moisture: 50- 100%

Fire Behavior Outputs

Scorch Height: 0- 30'

Rate of Spread: 1- 3 chains per hour

Flame Length: .5- 2.5'

Heat per Unit Area: 255- 525 BTU per square foot

Fireline Intensity: 4- 30 BTU per foot per second

* These are generalized prescription parameters. The burn boss is responsible for addressing topographic features outside the range listed in order to meet their burn objectives (usually accomplished by varying the firing pattern, sequence and rate of ignition).

Burning Prescription

Fuel Model NFFL 4 - tall brush (chamise & manzanita) *

Head Fire

Environmental Conditions

Air Temperature: 30- 85 F

Relative Humidity: 20- 60%

Wind Speed (midflame - MFWS) see combinations with fine fuel moisture below

Slope: 0- 45%

1- Hour Time Lag: 5- 9% (MFWS 0- 4) / 10- 12% (MFWS 0- 8)

10- Hour Time Lag: 6- 10% (MFWS 0- 4) / 11- 13% (MFWS 0- 8)

100- Hour Time Lag: 7- 11% (MFWS 0- 4) / 12- 14% (MFWS 0- 8)

1000- Hour Time Lag: N/A

Live Foliage Moisture: 50- 150%

Fire Behavior Outputs

Scorch Height: N/A

Rate of Spread: 2- 120 chains per hour

Flame Length: 3- 25'

Heat per Unit Area: 1570- 2910 BTU per square foot

Fireline Intensity: 50- 6330 BTU per foot per second

Prescribed Head Fire Matrix for Flame Length (feet) / Rate Of Spread (Chains / hour)			
1 Hour Fuel Moisture	5%	9%	12%
MFWS = 0	12.3 / 24.3	10.9 / 20.8	10.0 / 18.7
MFWS = 4	24.8 / 111.4	22.0 / 95.4	20.2 / 85.6
MFWS = 8	* 36.5 / 257.3	* 32.3 / 220.4	* 29.7 / 197.7

* Out of prescription

* These are generalized prescription parameters. The burn boss is responsible for addressing topographic features outside the range listed in order to meet their burn objectives (usually accomplished by varying the firing pattern, sequence and rate of ignition).

Burning Prescription

Fuel Model NFFL 5 - low brush **

Head Fire

Environmental Conditions

Air Temperature: 30- 80 F

Relative Humidity: 20- 60%

Wind Speed (midflame - MFWS) see combinations with fine fuel moisture below

Slope: 0- 35%

1- Hour Time Lag: 5- 7% (MFWS 0- 2) / 8- 12% (MFWS 2- 8) with live fuel moisture of 100- 150%

10- Hour Time Lag: 6- 12% (MFWS 0- 2) / 9- 13% (MFWS 0- 8) with live fuel moisture of 100- 150%

100- Hour Time Lag: N/A

1000- Hour Time Lag: N/A

Live Foliage Moisture: 70- 150%

Fire Behavior Outputs

Scorch Height: N/A

Rate of Spread: 2- 17 chains per hour

Flame Length: 1- 5'

Heat per Unit Area: 215- 715 BTU per square foot

Fireline Intensity: 7- 221 BTU per foot per second

Prescribed Head Fire Matrix for Flame Length (feet) / Rate Of Spread (Chains/hour)			
1 Hour Fuel Moisture	5%	7%	12%
MFWS = 0	3.8 / 7.8	3.6 / 7.3	1.2 / 2.3
MFWS = 2	5.4 / 16.9	5.1 / 15.9	1.8 / 5.0
MFWS = 8	* 10.4 / 70.8	* 9.9 / 66.7	* 3.4 / 20.8

* Out of prescription

** These are generalized prescription parameters. The burn boss is responsible for addressing topographic features outside the range listed in order to meet their burn objectives (usually accomplished by varying the firing pattern, sequence and rate of ignition).

Burning Prescription

Fuel Model NFFL 8 - closed timber, short needle conifer *

Head Fire

Environmental Conditions

Air Temperature: 40- 85 F

Relative Humidity: 20- 60%

Wind Speed (midflame - MFWS) see combinations with fine fuel moisture below

Slope: 0- 60%

1- Hour Time Lag: 3- 10% (MFWS 0- 10)

10- Hour Time Lag: 4- 11% (MFWS 0- 10)

100- Hour Time Lag: 5- 12% (MFWS 0- 10)

1000- Hour Time Lag: 10- 20%

Live Foliage Moisture: N/A

Fire Behavior Outputs

Scorch Height: 0- 30'

Rate of Spread: 0- 8 chains per hour

Flame Length: 0- 2.5'

Heat per Unit Area: 165- 225 BTU per square foot

Fireline Intensity: 1- 35 BTU per foot per second

Prescribed Head Fire Matrix for Flame Length (feet) / Rate Of Spread (Chains/hour)			
1 Hour Fuel Moisture	3%	7%	10%
MFWS = 0	1.2 / 2.0	0.9 / 1.3	0.8 / 1.1
MFWS = 5	1.7 / 4.3	1.3 / 3.0	1.1 / 2.5
MFWS = 10	2.3 / 8.4	1.5 / 4.2	1.3 / 3.1

* These are generalized prescription parameters. The burn boss is responsible for addressing topographic features outside the range listed in order to meet their burn objectives (usually accomplished by varying the firing pattern, sequence and rate of ignition).

Burning Prescription

Fuel Model NFFL 9 - broadleaf deciduous hardwoods and long needle pine **

Head Fire

Environmental Conditions

Air Temperature: 40- 85 F

Relative Humidity: 20- 60%

Wind Speed (midflame - MFWS) see combinations with fine fuel moisture below

Slope: 0- 45%

1- Hour Time Lag: 5- 7% (MFWS 0- 6) / 8- 12% (MFWS 0- 8)

10- Hour Time Lag: 6- 8% (MFWS 0- 6) / 9- 13% (MFWS 0- 8)

100- Hour Time Lag: 7- 9% (MFWS 0- 6) / 10- 14% (MFWS 0- 8)

1000- Hour Time Lag: 10- 20%

Live Foliage Moisture: N/A

Fire Behavior Outputs

Scorch Height: 0- 30'

Rate of Spread: 1- 18 chains per hour

Flame Length: 1- 4 ft.

Heat per Unit Area: 320- 390 BTU per square foot

Fireline Intensity: 4- 120 BTU per foot per second

Prescribed Head Fire Matrix for Flame Length (feet) / Rate Of Spread (Chains/hour)			
1 Hour Fuel Moisture	5%	7%	12%
MFWS = 2	2.5 / 5.7	2.2 / 4.8	1.9 / 3.7
MFWS = 5	3.6 / 12.5	3.2 / 10.6	2.7 / 8.3
MFWS = 8	* 4.7 / 23.3	* 4.2 / 19.7	3.6 / 15.4

* Out of prescription

Backing Fire (wind upslope)

Environmental Conditions

Air Temperature: 40- 85 F

Relative Humidity: 20- 60

Wind Speed: (midflame - MFWS) see combinations with fine fuel moisture below

Slope: 0- 100%

1- Hour Time Lag: 3- 10% (MFWS 0- 4)

10- Hour Time Lag: 4- 11% (MFWS 0- 4)

100- Hour Time Lag: 5- 12% (MFWS 0- 4)
 1000- Hour Time Lag: 10- 20%
 Live Foliage Moisture: N/A

Fire Behavior Outputs

Scorch Height: 0- 30'
 Rate of Spread: 0- 1 chains per hour
 Flame Length: .5- 3'
 Heat per Unit Area: 350- 450 BTU per square foot
 Fireline Intensity: 4- 60 BTU per foot per second

** These are generalized prescription parameters. The burn boss is responsible for addressing topographic features outside the range listed in order to meet their burn objectives (usually accomplished by varying the firing pattern, sequence and rate of ignition).

Burning Prescription

Fuel Model NFFL 10 - timber litter *

Head Fire

Environmental Conditions

Air Temperature: 40- 75 F
 Relative Humidity: 20- 60%
 Wind Speed (midflame - MFWS) see combinations with fine fuel moisture below
 Slope: 0- 45%
 1- Hour Time Lag: 5- 7% (MFWS 0- 6), 8- 12% (MFWS 0- 8)
 10- Hour Time Lag: 6- 8% (MFWS 0- 6), 9- 13% (MFWS 0- 8)
 100- Hour Time Lag: 7- 9% (MFWS 0- 6), 10- 14% (MFWS 0- 8)
 1000- Hour Time Lag: 10- 20%
 Live Foliage Moisture: N/A

Fire Behavior Outputs

Scorch Height: 0- 30'***
 Rate of Spread: 1- 18 chains per hour
 Flame Length: 1- 4 ft.
 Heat per Unit Area: 320- 390 BTU per square foot
 Fireline Intensity: 4- 120 BTU per foot per second

Prescribed Head Fire Matrix for Flame Length (feet) / Rate Of Spread (Chains/hour)			
1 Hour Fuel Moisture	5%	7%	12%
MFWS = 2	5.5 / 9.0	5.2 / 8.2	4.6 / 6.9
MFWS = 6	8.3 / 21.4	7.7 / 19.5	6.9 / 16.6
MFWS = 8	9.6 / 29.4	8.9 / 26.8	7.9 / 22.7

Backing Fire (wind upslope)

Environmental Conditions

Air Temperature: 40- 85 F

Relative Humidity: 20- 60

Wind Speed: (midflame - MFWS) see combinations with fine fuel moisture below

Slope: 0- 100%

1- Hour Time Lag: 3- 10% (MFWS 0- 4)

10- Hour Time Lag: 4- 11% (MFWS 0- 4)

100- Hour Time Lag: 5- 12% (MFWS 0- 4)

1000- Hour Time Lag: 10- 20%

Live Foliage Moisture: N/A

Fire Behavior Outputs

Scorch Height: 0- 30'

Rate of Spread: 0- 1 chains per hour

Flame Length: .5- 3'

Heat per Unit Area: 350- 450

Fireline Intensity: 4- 60

* These are generalized prescription parameters. The burn boss is responsible for addressing topographic features outside the range listed in order to meet their burn objectives (usually accomplished by varying the firing pattern, sequence and rate of ignition).

Firing and Holding Plan

A. Test Fire Procedure:

B. Firing Procedure

- Hot End:
- Cool End:
- Describe actions to be taken if burning prescriptions are exceeded on the hot end:
- Will aerial ignition be used? (Ensure minimum requirement / minimum tool is addressed)

C. Holding Procedure

- Hot End:
- Cool End:
- Describe actions to be taken if burning prescriptions are exceeded on the cool end.:

D. Slop- over Containment Procedure

- Potential Slope- over Area(s):
- Critical Holding Area(s):
- Slopover Containment Resource Needs:
- Initial Slopover Notification Procedure:

Smoke Management and Air Quality

Smoke Emissions

A. Estimated Smoke Emissions Period:

B. Estimated Smoke Emissions:

Estimated PM- 10 Emissions

Fuel Type	Total Burn Unit Estimated Emissions
NFFL 1 – annual grass	19 pounds/acre x acres burned = pounds
NFFL 2 – grass with overstory	42 pounds/acre x acres burned = pounds
NFFL 4 – tall brush (chamise and manzanita)	322 pounds/acre x acres burned = pounds
NFFL 5 – low brush	70 pounds/acre x acres burned = pounds
NFFL 8 – closed timber, short needle conifer	258 pounds/acre x acres burned = pounds
NFFL 9 – broadleaf deciduous hardwoods and long needle pine	1,293 pounds/acre x acres burned = pounds
NFFL 10 – timber litter	1,650 pounds/acre x acres burned = pounds
SEKI Custom 14 low elevation short needle conifer	1,321pounds/acre x acres burned = pounds
SEKI Custom 18 high elevation short needle conifer	1,251pounds/acre x acres burned = pounds

Total Estimated PM- 10 Emissions: pounds.

Estimated CO Emissions

Fuel Type	Total Burn Unit Estimated Emissions
NFFL 1 – annual grass	184 pounds/acre x acres burned = pounds
NFFL 2 – grass with overstory	302 pounds/acre x acres burned = pounds
NFFL 4 – tall brush (chamise and manzanita)	3,196 pounds/acre x acres burned = pounds
NFFL 5 – low brush	698 pounds/acre x acres burned = pounds
NFFL 8 – closed timber, short needle	2,332 pounds/acre x acres burned = pounds
NFFL 9 – broadleaf deciduous hardwoods and long needle pine	11,816 pounds/acre x acres burned = pounds
NFFL 10 – timber litter	15,800 pounds/acre x acres burned = pounds
SEKI Custom 14 low elevation short needle conifer	12,625 pounds/acre x acres burned = pounds
SEKI Custom 18 high elevation short needle conifer	11,950 pounds/acre x acres burned = pounds

Total Estimated CO Emissions: pounds

* Estimated emissions based on FOFEM calculations using park average fuel loadings and average prescription conditions- - fuel moisture and consumption (2001).

Smoke Sensitive Areas

(attach map showing smoke sensitive areas with in 15 miles of the burn unit and show day time and night time estimated smoke plume directions)

A. Smoke Sensitive Areas Within 15 Miles of Burn Unit:

Smoke Sensitive Area	Distance From Burn Unit	Compass Direction From Burn Unit (SW, N, etc.)	Population	Critical Receptors - schools - retirement communities - general hospitals

B. Estimated Smoke Impact to Smoke Sensitive Areas:

- Desirable Smoke Dispersal Transport Winds Direction and Speed:
- Undesirable Smoke Dispersal Transport Winds Direction and Speed:
- Estimated Day Time Smoke Plume Direction and Potential Impact:
- Estimated Night Time Smoke Plume Direction and Potential Impact:

Smoke Monitoring

A. Type and Interval of Monitoring:

B. Smoke Sensitive Area Health Impacts Monitoring:

Burn Day Regulation

A. Burn Day Notice Procedure:

Roadway Safety

Minimum acceptable visibility and speed limits, or traffic control, for all public roadways will be enforced by speed limit signs or traffic controllers. Any compromised roadway conditions should be relayed to the Burn Boss immediately, day or night, on shift or off shift.

Road Control Guideline For Two Lane, Two Way Road, Day Light Hours:

Posted Speed Limit	Minimum Acceptable Visibility
10 mph	56 feet if less than 56 feet begin one-way traffic control
15 mph	100 feet
25 mph	216 feet
35 mph	370 feet
45 mph	566 feet

Road Control Guideline For Two Lane, Two Way Road, Night Time Hours:

Posted Speed Limit	Minimum Acceptable Visibility
10 mph	112 feet if less than 112 feet begin one-way traffic control
15 mph	200 feet
25 mph	432 feet
35 mph	740 feet
45 mph	1132 feet

Escaped Fire and Smoke Contingency Transition Planning

- A. Transition to Wildland Fire Planning Process:
- B. Smoke Contingency - Mitigation of Smoke Impacts to Smoke Sensitive Areas based on information described in the Smoke Management and Air Quality section
 - Notification and Coordination with Impacted Air District Procedure:
 - Logging of Smoke Complaints Procedure:
 - Community Outreach Procedure:
 - Media Contact Procedure:
 - Smoke Impact Reduction Procedure:
 - Transition to Wildland Fire Planning Process:

Protection of Sensitive Features

- A. Identification and Protection of Sensitive Species Procedure:
- C. Cultural Clearance Procedure:
- D. Wilderness Minimum Tool Analysis
- E. Trees of Special Interest / Special Management Areas

Public and Fire Personnel Safety

- A. Public Safety Procedure
 - Fire Hazards:
- B. Fire Personnel Safety Procedure
 - Fire Hazards:
 - Unhealthy Smoke:
- C. First Aid and MEDIVAC Procedure:

Interagency/Intragency Coordination and Public Involvement

- A. Employee and Public Information Outreach Procedure:

B. Fire Dispatch Situation Update Procedure:

Monitoring and Evaluation

A. Fuels:

B. Weather:

C. Fire Behavior:

D. Smoke Behavior:

E. Fire Effects:

Rehabilitation

A. Rehabilitation Procedure:

Documentation

Attachments

- Wildland and Prescribed Fire Complexity Rating Worksheet
- Wildland and Prescribed Fire Complexity Rating Worksheet Numeric Rating Guide
- Park Superintendent Go/No- Go Pre- Ignition Approval
- Briefing Guide
- Burn Plan Execution Go/No Go Checklist
- Sloper Containment Resource Needs Worksheet
- Burn Plan Technical Review
- Park Review Comments
- Cultural Resources Clearance.
- Vicinity Map.
- 7.5 minute project topographic map (original) showing geographic organizational lay- out using ICS map symbols and terminology, and shows critical holding areas and values at risk inside and outside the burn segment area.
- 7.5 minute project vegetation map.
- 7.5 minute project fuels map.

WILDLAND AND PRESCRIBED FIRE COMPLEXITY RATING WORKSHEET

Complexity element	Weighting factor	Complexity value	Total points
Safety	5		
Threats to boundaries	5		
Fuels and fire behavior	5		
Objectives	4		
Management organization	4		
Improvements	3		
Natural, cultural, social values	3		
Air quality values	3		
Logistics	3		
Political concerns	2		
Tactical operations	2		
Interagency coordination	1		

Total complexity points

Complexity Rating (circle)

L

M

H

Complexity Value Breakpoints:

Low	40-90 – <i>Burn Boss 2 Required</i>
Moderate	91-140 – <i>Burn Boss 2 Required</i>
High	141- 200 – <i>Burn Boss 1 and Safety Officer Required</i>

The Wildland and Prescribed Fire Complexity Analysis provides a method to assess the complexity of both wildland and prescribed fires. The analysis incorporates an assigned numeric rating complexity value for specific complexity elements that are weighted in their contribution to overall complexity. The weighted value is multiplied times the numeric rating value to provide a value for that item. Then all values are added to generate the total complexity value. Breakpoint values are provided for low, moderate, and high complexity values. **Only use Complexity Values 1, 3 or 5 – no even numbers allowed.**

The complexity analysis worksheet is accompanied by a guide to numeric values for each complexity element shown, provided on the following pages.

Wildland and Prescribed Fire Complexity Rating Worksheet Numeric Rating Guide

COMPLEXITY ELEMENT	GUIDE TO NUMERIC RATING		
	1	3	5
Safety	Safety issues are easily identifiable and mitigated	Number of significant issues have been identified All safety hazards have been identified on the LCES worksheet and mitigated	SOF1 or SOF2 required Complex safety issues exist
Threats to Boundaries	Low threat to boundaries POI<50% Boundaries naturally defensible	Moderate threat to boundaries 50<POI<70% Moderate risk of slopover or spot fires Boundaries need mitigation actions for support to strengthen fuel breaks, lines, etc.	High threat to boundaries POI>70% High risk of slopover or spot fires Mitigation actions necessary to compensate for continuous fuels
Fuels/Fire Behavior	Low variability in slope & aspect Weather uniform and predictable Surface fuels (grass, needles) only Grass/shrub, or early seral forest communities Short duration fire No drought indicated	Moderate variability in slope & aspect Weather variable but predictable Ladder fuels and torching Fuel types/loads variable Dense, tall shrub or mid-seral forest communities Moderate duration fire Drought index indicates normal conditions to moderate drought; expected to worsen	High variability in slope & aspect Weather variable and difficult to predict Extreme fire behavior Fuel types/loads highly variable Late seral forest communities or long-return interval fire regimes Altered fire regime, hazardous fuel /stand density conditions Potentially long duration fire Drought index indicates severe drought; expected to continue

COMPLEXITY ELEMENT	GUIDE TO NUMERIC RATING		
	1	3	5
Objectives	Maintenance objectives Prescriptions broad Easily achieved objectives	Restoration objectives Reduction of both live and dead fuels Moderate to substantial changes in two or more strata of vegetation Objectives judged to be moderately hard to achieve Objectives may require moderately intense fire behavior	Restoration objectives in altered fuel situations Precise treatment of fuels and multiple ecological objectives Major change in the structure of 2 or more vegetative strata Conflicts between objectives and constraints Requires a high intensity fire or a combination of fire intensities that is difficult to achieve
Management Organization	Span of control held to 3 Single resource incident or project	Span of control held to 4 Multiple resource incident or project Short-term commitment of specialized resources	Span of control greater than 4 Multiple branch, divisions or groups Specialized resources needed to accomplish objectives Organized management team (FUMT, IMT)
Improvements to be Protected	No risk to people or property within or adjacent to fire	Several values to be protected Mitigation through planning and/or preparations is adequate May require some commitment of specialized resources	Numerous values and/or high values to be protected Severe damage likely without significant commitment of specialized resources with appropriate skill levels
Natural, Cultural, and Social Values to be Protected	No risk to natural, cultural, and/or social resources within or adjacent to fire	Several values to be protected Mitigation through planning and/or preparations is adequate May require some commitment of specialized resources	Numerous values and/or high values to be protected Severe damage likely without significant commitment of specialized resources with appropriate skill levels

COMPLEXITY ELEMENT	GUIDE TO NUMERIC RATING		
	1	3	5
Air Quality Values to be Protected	Few smoke sensitive areas near fire Smoke produced for less than 1 burning period Air quality agencies generally require only initial notification and/or permitting No potential for scheduling conflicts with cooperators	Multiple smoke sensitive areas, but smoke impact mitigated in plan Smoke produced for 2-4 burning periods Daily burning bans are sometimes enacted during the burn season Infrequent consultation with air quality agencies is needed Low potential for scheduling conflicts with cooperators	Multiple smoke sensitive areas with complex mitigation actions required Health or visibility complaints likely Smoke produced for greater than 4 burning periods Multi-day burning bans are often enacted during the burn season Smoke sensitive class 1 airsheds Violation of state and federal health standards possible Frequent consultation with air quality agencies is needed High potential for scheduling conflicts with cooperators
Logistics	Easy access Duration of fire support is less than 4 days	Difficult access Duration of fire support between 4 and 10 days Logistical position assigned Anticipated difficulty in obtaining resources	No vehicle access Duration of support is greater than 10 days Multiple logistical positions assigned Remote camps and support necessary
Political Concerns	No impact on neighbors or visitors No controversy No media interest	Some impact on neighbors or visitors Some controversy, but mitigated Press release issued, but no media activity during operations	High impact on neighbors or visitors High internal or external interest and concern Media present during operations

COMPLEXITY ELEMENT	GUIDE TO NUMERIC RATING		
	1	3	5
Tactical Operations	No ignition or simple ignition patterns Single ignition method used Holding requirements minimal	Multiple firing methods and/or sequences Use of specialized ignition methods (i.e. terra-torch, Premo Mark III) Resources required for up to one week Holding actions to check, direct, or delay fire spread	Complex firing patterns highly dependent upon local conditions Simultaneous use of multiple firing methods and/or sequences Simultaneous ground and aerial ignition Use of heli-torch Resources required for over 1 week Multiple mitigation actions at variable temporal and spatial points identified. Success of actions critical to accomplishment of objectives Aerial support for mitigation actions desirable/necessary
Interagency Coordination	Cooperators not involved in operations No concerns	Simple joint-jurisdiction fires Some competition for resources Some concerns	Complex multi-jurisdictional fires High competition for resources High concerns

Park Superintendent Go/No Go Pre-ignition Approval

Burn Plan Name

Instructions. The Superintendent's Go/No Go Pre- ignition Approval is the final management approval prior to execution of the prescribed burn and evaluates whether compliance requirements, prescribed fire plan elements, and internal and external notifications have been completed. This approval is for the initial execution of the prescribed burn. If ignition of the prescribed fire is not initiated prior to the expiration date determined by the Superintendent, a new one will be completed.

The answer to each of the following must be yes.

____ Is the prescribed burn plan up to date?

____ Is Risk Management in place?

____ Have all compliance requirements been completed?

____ Are all elements of the prescribed fire plan being met?

____ Have all internal and external notifications been made?

Recommended by: _____
Park Fire Management Officer Date

Approved by: _____
Park Superintendent Date

Approval Expires: _____
Date

Briefing Guide

A. Operational Objectives

B. Organizational Assignments

C. Incident Safety

- fire personnel safety procedure
 - fire hazards
 - unhealthy smoke
 - environmental hazards
 - LCES
- public safety procedure
 - fire hazards
 - unhealthy smoke
- first aid and MEDIVAC procedure

D. Incident Operations Strategy and Tactics

- prescription parameters
- test fire procedure
- firing procedure
- expected fire behavior
- holding procedure
- slop over containment procedure
- sensitive features
- weather forecast

E. Incident Communications

- radio frequencies
- radio use protocol
- available telephones and FAX
- fire dispatch situation update procedure

D. Incident Logistics

- equipment support procedure
- supplies support procedure
- food and water procedure
- sanitation facilities
- sleeping areas

E. Incident Finance/Administration

- personnel time keeping procedure
- compensation for injuries procedure
- damage to, or loss of equipment and supplies reporting procedure
- disposable supplies replacement procedure

F. Other:

G. Feedback

Burn Plan Execution Go/No Go Checklist

The answer to each of the following must be yes.

___ Burn plan is approved by park superintendent and distributed to key field supervisors.

___ Burn plan is approved by the local air district.

___ Park Superintendent Go/No Go Pre- ignition Approval is complete and current.

___ All personnel required in the IAP plan are on site.

___ All equipment and supplies required in the IAP are in position and working properly.

___ Employee and public information outreach is complete.

___ Fire monitoring is ready:

- fire weather observations
- fire behavior observations
- smoke observations
- fire effects plots/transects observations

___ IAP is distributed to overhead personnel.

___ All fire personnel have received a briefing.

___ All prescription parameters have been met:

- pre- burn preparation is complete
- smoke management is favorable
- burning prescription if favorable
- current and forecasted weather is favorable
- sensitive species review is complete
- cultural clearance is complete

___ Fire dispatch has made required notifications.

___ Contingency resources described in the plan have been committed and are available within the specified time- frames.

___ A significant test fire designed to establish fire control and smoke dispersal is ready to go.

___ Incident personnel are ready to enforce roadway speed limits or control traffic due to reduced visibility per Smoke Management and Air Quality.

___ There are no extenuating circumstances that preclude successful completion of this project.

All above elements must be yes in order to proceed with the test fire.

____ Test fire demonstrates that holding resources are able to safely implement holding tactics.

____ Fire behavior is within prescription and is expected to stay in prescription into the foreseeable future.

____ Test fire results indicate burn objectives will be met.

Burn Plan Name

Ignition Specialist Printed Name
Time

Signature

Date

Holding Supervisor Printed Name

Signature

Date

Time

Burn Boss Printed Name

Signature

Date

Time

Sloper Containment Resource Needs Worksheet

Sloper containment resource needs are determined by analyzing the worst case sloper scenario based on the location along the burn perimeter that poses the most threat of sloper and calculating the potential spread and fire intensity of the sloper by using environmental inputs from the hot end and cool of the burning prescription and making BEHAVE run. The output information provided by the BEHAVE run is then used along with the standard fireline production rates found in the Fireline Handbook to determine the resources that will be needed to contain the sloper at established time intervals.

Burn Plan Name: _____

See Attached BEHAVE Run

Fire Behavior Fuel Model	Specific Conditions	Type 1* Hand Crew	Type 2* Hand Crew	Chains per Crew Hour** Number of Persons in Crew				
				1	2	3	4	5
1 Short Grass	Grass Tundra	30 9	18 5	6 2	12 8	24 15	35 24	40 30
2 Open Timber/Grass Understory	All	24	16	3	7	15	21	25
3 Tall Grass	All	5	3	2	5	10	14	16
4 Chaparral	Chaparral High Pocosin	5 4	3 2	2 2	3 4	8 10	15 15	20 18
5 Bush	All	6	4	3	6	12	16	20
6 Dormant Brush/Hardwood Slash	Black Spruce Others	7 6	5 4	3 3	6 6	10 12	16 16	20 20
7 Southern Rough	All	4	2	2	5	12	16	20
8 Closed Timber Litter	Conifers Hardwoods	7 40	5 24	3 10	8 30	15 40	20 50	24 60
9 Hardwood Litter	Conifers Hardwoods	28 40	16 24	3 8	7 25	12 40	18 50	22 60
10 Timber Litter	All	6	4	3	8	12	16	20
11 Light Logging Slash	All	15	9	3	8	12	16	20
12 Medium Logging	All	7	4	3	5	10	16	20
13 Heavy Logging Slash	All	5	3	2	4	8	15	20

* Sustained line production rates of 20-person crews for Construction, Burnout, and Holding in Chains per Hour. Allowances have been made in production rates for rest periods and cumulative fatigue.

** These rates are to be used for estimating initial action productivity only. DO NOT use these rates to estimate sustained line construction, burnout, and holding productivity. Initial action may consist of scratch line construction and hotspotting.

Time Lapsed	Hot/Cool RX End	Fuel Model	Hand Crew Type	Line Production Rate in Chains per Hour	Chains of Line Needing Completion	Number of Crews Needed
1	Hot					
3	Hot					
6	Hot					

12	Hot					
1	Cold					
3	Cold					
6	Cold					
12	Cold					

Prepared by: _____ Date: _____
 Job Title

Burn Plan Technical Review

Burn Plan Name: _____

Burn Plan Section	Review Status	Date	Initials
Signature Page			
Executive Summary			
Goals and Objectives			
Burn Unit Description			
Project Complexity			
Burn Organization			
Estimated Costs			
Scheduling			
Pre-Burn Planning and Preparation Considerations			
Burning Prescription			
Firing and Holding Plan			
Smoke Management and Air Quality			
Escaped Fire and Smoke Contingency Transition Planning			
Protection of Sensitive Features			
Public and Personnel Safety			
Interagency/Intragency Coordination and Public Involvement			
Monitoring and Evaluation			
Rehabilitation			
Documentation			
Attachments: Cultural Resources Clearance Prescribed Fire Complexity Rating Guide Slopover Containment Resource Needs Worksheet Technical Review Park Staff Comments Park Superintendent Go/No Go Pre-ignition Approval Briefing Guide Burn Plan Execution Go/No Go Checklist Vicinity Map 7.5 minute project topographic map 7.5 minute project vegetation map 7.5 minute project fuels map			

Status:

- + Adequate – meets NPS standards
- o Adequate with modification – see comments
- Deficient
- NC Unable to evaluate

Comments:

Reviewed by: _____ Date: _____
 Job Title

Park Review Comments

Burn Plan Name: _____

Please note comments you have concerning this prescribed burn plan.

Fire Management Officer:

Division of Visitor and Fire Management:

Division of Science and Resources Management:

Division of Cultural Resources and Interpretation:

Superintendent:

Other:

USDI National Park Service
Sequoia and Kings Canyon National Parks

Manual Fuels Treatment Plan

PROJECT NAME: Silver City

Prepared by: Corky Conover Date: 3/20/02

Recommended by: _____ Date: _____
District Ranger

Recommended by: _____ Date: _____
District FMO

Recommended by: _____ Date: _____
Park Fire Management Officer

Recommended by: _____ Date: _____
Chief Ranger

Recommended by: _____ Date: _____
Natural Resources Management Specialist (Fire)

Recommended by: _____ Date: _____
Chief, Resources Management & Fire Management Committee Chair

Recommended by: _____ Date: _____
Chief, Cultural Resources and Interpretation

Approved by: _____ Date: _____
Park Superintendent

For information about this project contact:
Fire Management Office 559- 565- 3164/3165
FAX 559- 565- 3797
24- Hour Park Dispatch 559- 565- 3341

Executive Summary

Due to extensive fire suppression over the past century, dead and down fuels continue to accumulate in the forests of the East Fork of the Kaweah River. Dense thickets of small trees and shrubs that would have been kept in check by frequent natural fires contribute additional significant risk to the human made developments and infrastructure.

The proposed work will restore the project sites to more natural fuel load and forest structure while creating a reduced fuel environment between the developments and extensive NPS wildlands and wilderness surrounding the developments. The reduced fuel areas will facilitate the proactive implementation of the parks fire management objectives of restoring fire to the surrounding ecosystem and providing for public and firefighter safety.

The Silver City development contains private lands, park service lands and structures (private and NPS), and are fully surrounded by NPS lands. Private landowners have worked to reduce hazardous levels of fuels in and adjacent to their buildings and within property lines. The efforts on the private lands are, in some cases, inadequate for providing defensible space in the event of a wildfire due to the extreme fuel load on adjacent NPS lands. The NPS has been working over the past six years to reintroduce fire to the East Fork as a way to restore and maintain ecosystem function as well as to reduce hazardous levels of fuels. To continue to implement the prescribed fire program while buffering the private lands from wildfire, the park proposes to create hazard fuel buffers at strategic points around those developments. The buffers would be used by the NPS as zones to implement prescribed fire projects outward onto adjacent wildlands. The buffers would provide an additional measure of defensible space to residents in case of a wildfire.

Description of the Fuels Treatment Area

- I. General Area Description: The project area is located in the middle third of the East Fork of the Kaweah river drainage on a southern aspect. The project would provide a 200 foot reduced fuel buffer below the Silver City development (Private and NPS) and the only access road. A handline and prescribed fire project will be implemented in the future to provide fire protection from above the development.
2. Location:
 - A. Tulare County
 - B. 36° 27' 54" Latitude 118° 38' 48" Longitude
 - C. Kaweah Zone - East Fork Fire Management Unit
3. Geographic Attributes:
 - A. Project Size: 25 acres
 - B. Elevation range: 6040 – 7000 feet.
 - C. Slope range: 0 -50%
 - D. Aspect: S- SW
4. Project Boundaries (See Project Map): The project is bounded to the north by the Mineral King road. To the west the 200 foot wide treatment zone goes from the Mineral King road at about 6860 foot elevation down hill to the S- SE to just above (6720' elevation) the NE corner of the Kaweah Hahn private in holding boundary due south to the East Fork along the eastern edge of the in holding property boundary. To the south,

the 200- foot wide treatment zone goes from just below the SE corner of the Silver City private property boundary at approximately 6800- foot level along the contour to the W/SW to the intersection with the western project boundary at about the 6720- foot elevation. To the east the 200 foot wide treatment zone goes from the Mineral King road on the east side of the NPS housing area to about the 6860 contour level and then goes west to the east side of the Silver City private property boundary back up to the road.

5. **Vegetation Types:** The project is located in the White Fir Mixed Conifer vegetation type with no recent recorded history of fire disturbance. The fuels can best be represented by Northern Forest Fire Lab (NFFL) fuel model 10.
6. **Designated / Proposed / Recommended Wilderness?** Yes No

Vegetation Type	Fuel Model NFFL	Estimated Acres	Estimated Tons Per Acre
Heavy timber litter with understory vegetation	NFFL 10	25	86.85 tons/acre x 25 acres = 2171 tons

Total Estimated Pre- Project Tons/acre: 2117 tons/acre. Tons per acre estimate based on park-wide average fuel loading data for areas that have not been burned in the White Fir Mixed Conifer Vegetation Type since fire exclusion began in the late 19th century.

Goals and Objectives

The main project goal is to provide a reduced fuel buffer around the Silver City development that will allow for the protection of the development, provide for public and fire fighter safety during fire events, and facilitate the restoration of fire to the surrounding wildlands.

1. **Fuel Reduction:** To reduce the total dead and down woody fuel loading to less than 12 tons/acre and maintain this load within the treatment zone into the future.
2. **Forest Structure:** To reduce the number of smaller understory trees so that there will be a maximum of 25 tree/acre less than 40 feet in height remaining within the treatment zone and maintain this into the future.

Estimated Costs

Item	Planning	Execution	Evaluation
Personnel	1000	45,000	5,000
Equipment (mileage, rental)	50	500	250
Aircraft	N/A	N/A	N/A
Supplies (non-rolling stock)	50	250	250
Phase Costs	1,100	45,750	5,500

Total estimated cost: \$52,350. (Does not include base 8 salary paid out of non-project accounts)
Estimated cost per acre: \$2094.00

Statement of Work

Silver City Developed Area Initial Thinning and Maintenance Specifications Hazard Abatement Reduction Operations

Responsible Position Target Date	Duties
Contract Crew or Fire Management Fire Crew(s). Initial treatment by the end of November of the year the work starts.	A 200 foot wide shaded fuel buffer around the development below the road will be thinned from below and cleared according to the following fuel hazard reduction and landscape considerations (see attached map). - There will be a maximum of 25 trees/acre less than 40 feet in height remaining after the thinning. - All live trees over 40 feet tall will remain uncut. All larger trees remaining will be limbed up to at least 6 feet above the ground. - When removing a lateral branch at its point of origin on the trunk or parent limb, the final cut shall be made in branch tissue close to the trunk or parent limb, without cutting into the branch bark ridge or collar, or leaving a stub. - When removing a dead branch, the final cut shall be made just outside the collar of live tissue. If the collar has grown out along the branch stub, only the dead stub shall be removed. The live collar shall remain intact and uninjured. - To prevent damage to the parent limb when removing a branch with a narrow branch attachment, the final cut shall be made from the bottom of the branch up. - Tree branches shall be removed in such manner so as not to cause damage to other parts of the tree. Branches too large to support with one hand shall be pre-cut to avoid splitting or tearing of the bark. - Felled trees will be limbed and bucked down to an 8-inch top and piled for later burning. Tree boles larger than 8 inches in diameter will be left unbucked. All tree boles left will remain in contact with the ground. All stumps will be flush cut and added to the burn piles. - Dead & down woody material (1-8 inches in diameter) will be gathered and piled with larger logs limbed and bucked to an 8 inch top and piled for later burning. Tree boles larger than 8 inches in diameter will be left unbucked. - Piles shall be appropriately sized and located in openings far enough away from residual vegetation to prevent or minimize scorch. - Piles shall have a minimum height of 3 feet and a maximum height of 6 feet. - Piles shall be located at least 15 feet from any residual green tree in the downhill or side-slope direction from the pile, and at least 20 feet from any residual green tree upslope of the pile. - Piles shall be constructed reasonably compact and free of soil to facilitate burning. - Piles shall also be constructed with enough fine material (less than ¼ inch diameter), such as twigs and needles, to easily ignite and burn the pile. - All piles should have a good base to prevent the pile from toppling. - Piles shall be covered with durable paper prior to precipitation.

- Local Fire Management Crew(s). - Maintenance of the fuel treatment zone annually by the end of July.	Water resistant "Kraft" paper (Clean Burn Kraft Paper – available from http://www.baileys-online.com/store.html – see attached tear sheet) or approved substitute may be used. No plastic material will be used to cover piles. The covering shall be placed over the center of the pile. The paper shall cover a minimum of 75% of the surface of each pile. - Pieces of branch wood shall be placed on the top to secure the paper against reasonable wind events. - Larger brush patches will have a minimum 20-foot wide path cleared, and the cut material piled for later burning to facilitate future Fireline construction located in a defensible area within the treatment area. - Any stumps larger than 8 inches in diameter will be treated with borax to prevent root rot. The treatment zone will be maintained on a regular and reoccurring basis. - Established seedlings and saplings will be thinned every 10-15 years to maintain stocking densities at prescribed levels favoring shade intolerant species. The slash generated will be piled and burned. - The 20 foot wide, cleared brush zone will be maintained by cutting sprouting brush on a 5-10 year cycle. The cut material will be piled and burned. - Re-accumulations of dead & down woody material will be gathered and piled with larger logs limbed and bucked to an 8-inch top and piled for later burning on a 5-year cycle.
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Silver City Pre Thinning Representation



3-MC-3

Data Associated with Pre Treatment Photo Representation

LOADING			OTHER MEASUREMENTS	
Size class (inches)	Weight (tons/acre)	Volume (ft ³ /acre)	Average residue depth	(feet) 1.2
0.0 - 0.25	0.8	51	Ground area covered by residue	(percent) 75
0.26 - 1.0	2.7	180	Average duff and litter depth	(inches) 1.1
1.1 - 3.0	2.6	209	Ground area covered by duff and litter	(percent) 91
3.1 - 9.0	10.6	848	Sound residue 3.1-inch diameter and larger	(percent) 88
9.1 - 20.0	26.8	2,257	Rotten residue 3.1-inch diameter and larger	(percent) 12
20.1+	0	0		
Total	43.5	3,545		

STAND INFORMATION		BRUSH INFORMATION	ASSESSMENT OF FIRE BEHAVIOR AND SUPPRESSION DIFFICULTY
Trees over 20-inch d.b.h.	Trees and dead stems under 8-inch d.b.h.	Dominant species	Spread rate (chains/hour) 3
Dominant species <u>grand fir</u>	Dominant species <u>Douglas-fir</u>	<u>wildrose</u>	Flame length (feet) 4
Trees per acre 17	Trees per acre 150	Average height (inches) 17	Resistance to suppression (chains/man-hour) 1.1
Average d.b.h. (inches) 22	Average d.b.h. (inches) 2	Average crown height (inches) 14	Ecoclass coding <u>CWF3-11</u>
Average tree height (feet) 58	Average tree height (feet) 9	Ground space occupied (percent) 2	
Average crown height (feet) 11	Average crown height (feet) 1		
Estimated crown space occupied (percent) 10	Estimated crown space occupied (percent) 10		
		GRASS AND FORBS INFORMATION	REMARKS
Trees 8- to 20-inch d.b.h.	Snags 8-inch d.b.h. and over	Dominant species	
Dominant species <u>Douglas-fir</u>	Number per acre 21	<u>elk sedge</u>	
Trees per acre 156	Average d.b.h. 23	Average height (inches) 4	
Average d.b.h. (inches) 15	Average height 60	Ground space (percent) 11	
Average tree height (feet) 75		Estimated weight (pounds per acre)	
Average crown height (feet) 27			
Estimated crown space 50			

Silver City Post Treatment Representation



1-MC-4-PC

Data Associated with Post Treatment Photo Representation

LOADING			OTHER MEASUREMENTS	
Size class (inches)	Weight (tons/acre)	Volume (ft ³ /acre)	Average residue depth (feet)	0.01
0.0 - 0.25	0.2	13	Ground area covered by residue 1/4-inch diameter and larger (percent)	89
0.26 - 1.0	2.0	134	Average duff and litter depth (inches)	.1
1.1 - 3.0	3.8	304	Sound residue 3.1-inch diameter and larger	
3.1 - 9.0	.5	42	white fir (percent)	60
9.1 - 20.0	0	0	incense-cedar (percent)	40
20.1+	0	0	(percent)	
Total	6.5	493	Rotted residue 3.1-inch diameter and larger (percent)	0

HARVEST INFORMATION		HARVEST INFORMATION SOURCE		ASSESSMENT OF FIRE BEHAVIOR AND SUPPRESSION DIFFICULTY	
		Sale records	Onsite estimation		
Gross volume	(M fbm/acre) 4.6	x		Spread rate (chains/hour)	3
Net volume	(M fbm/acre) 4.6	x		Flame length (feet)	2
Average stems/acre cut	15	x		Resistance to suppression (chains/man-hour)	6.0
Average d.b.h. of stems cut	(inches) 22	x		REMARKS	
Stand age	(years) 150		x		
Cutting prescription	Tree selection	x			
Yarding method	Tractor	x			
Slash treatment	Machine pile & burn		x		
Period since cut or treatment	(months) 8		x		

Protection of Sensitive Features

The project area will be cleared by the cultural resources specialist prior to the start of any work. A Finding of No Significant Impact (FONSI) was signed by the park's superintendent and approved by the regional director on 12/31/01. The following table is taken from the FONSI mentioned above following the project Environmental Assessment (EA).

Resource Value	Mitigation	Responsible Party
Public and Firefighter Safety	Implementation of the reduced fuel buffers will be carefully planned and conducted with full consideration of public safety. Project areas will be closed for short duration (1 hour to 1 week) to provide for safety during felling and clearing operations and during pile burning. Closures will be coordinated with Silver City Resort and other residents to minimize conflicts. Trees and snags to be removed will be felled away from private property and structures. Firefighter safety will be high priority and will be stressed through adherence to the standard firefighting orders and the use of full personal protective equipment at all times. A job hazard analysis will be conducted prior to any work, and all usual and customary safety practices will be implemented to insure safety of workers.	Fire Management Office and/or Contracting Officer
Ecological Function	The specifications for the reduced fuel buffer will result in fuel and forest canopy conditions closely resembling those desired for restoring natural conditions. The creation of a defensible buffer will allow future implementation of more widespread restoration of fire as an ecosystem process on adjacent NPS lands.	Park project manager will insure work conforms to specified standards.
Aesthetics	High fuel levels and dense thickets of trees will be reduced to natural levels. These conditions create a more open understory, a condition that is also attractive to many residents and visitors. The developed areas will blend more seamlessly into the natural environment more readily. Stumps will be flush cut and cut ends of logs will be treated to reduce visibility.	Park project manager will insure work conforms to specified standards.
Special Status Species	No special status wildlife or plant species will be affected.	N/A
Water and Wetlands	The use of vehicles in or around stream corridors will be prohibited. No soil disturbance will occur. Logs and other large woody debris over eight inches in diameter will remain in the streambeds and throughout the project area.	Park project manager will insure work conforms to specified standards.
Cultural Resources	The park archeologist will monitor ground-disturbing activity. Park staff overseeing the project will be trained to identify potential resources encountered. Any cultural resources detected will be avoided or fully mitigated to standards established by the park	Park Archeologist

Resource Value	Mitigation	Responsible Party
	archeologist prior to work being continued.	
Wilderness	Ensure discussion of minimum requirement / minimum tool. No vehicles will be used within the wilderness at Oriole Lake and all minimum tool requirements specified in the Assessment will be adhered to during implementation. The conditions created by the project will result in an area that will more closely resemble natural conditions. Creation of the reduced fuel buffer around the developments will result in conditions favorable to the reintroduction of fire and restoration of more natural conditions in the surrounding NPS wilderness areas.	Park project manager will insure work conforms to specified standards.
Air Quality	Air quality impacts in localized areas will occur because of the prescribed burning. All burning will be conducted in strict conformity with the requirements of the San Joaquin Air Pollution Control District. Burning will occur after Labor Day or before Memorial Day to minimize the numbers of visitors and residents exposed to smoke. Residents and visitors will be notified in advance of burning so they may avoid the smoke.	Fire Management Officer
Recreation	Project areas may be closed for short duration (1 hour to 1 week) to facilitate safe operations. Closures will be affected for the minimum amount of time necessary for safe operations. No public roads or trails will be closed. Areas will be restored to more natural appearance and function, enhancing the recreational experience.	Project manager in conjunction with area Rangers.

Public and Personnel Safety

Job Hazard Analysis (JHA) will be reviewed by project staff prior to the start of any new work on the project. Existing JHAs that can be used for chainsaw work (falling, bucking, limbing, sharpening), slash piles, environmental hazards and driving on narrow park roads are located on the parks network and will be made available to project crews. If the project has the potential to impact the traffic on the Mineral King road, traffic control will be in place with confirmed communications on both ends. Emergency Medical Technicians (EMTs), first responders, or first aide personnel will be identified in the field for each day of work as well as the procedures for medi- vac.

Interagency Coordination and Public Information

1. Employee and Public Information Outreach Procedure:

The fire information officer will coordinate public information for park visitors, park employees, and local communities. Special coordination will occur with the Mineral King

interpreters, Mineral King Rangers, District Fire Management Officer, Project Lead, and the local cabin owners association.

2. Notification of District and Fire Management Staffs about Preparation and Execution Procedure:

Sequoia district and Mineral King sub- district staff will be kept up to date about progress made concerning project execution, rehabilitation, and monitoring.

3. Fire Dispatch Situation Update Procedure:

Fire dispatch will be updated on the project status every day that personnel are on site, from preparation through execution, rehabilitation and monitoring phases.

All resource orders will be placed through fire dispatch. Fire dispatch will be kept informed about staffing, activity, and any problems relevant to the project on a daily basis.

Monitoring and Evaluation

- A. A permanent plot will be installed approximately every 5 chains along the outside edge of the thinning project, starting approximately 5 chains in from the Mineral King Road, looking back in towards the developed area. Previous experience has shown that 15- 20 sample points will generate adequate data to represent the area statistically. The sampling intensity indicated above should yield the desired number of sample points. The sample point will be marked by a single rebar stake, that will be painted orange to facilitate relocation. The rebar stake will have a tag that identifies the project name (Silver City Thinning) and plot number.

A photo series estimate of the total woody fuel load will be taken from this point looking back into the project area with the plot centerline being perpendicular to the outside edge of the project (see plot diagram). The photo series estimate will go out from the sample point at 45° angles from either side of the stake out for 100 feet. The total fuel load estimate will be recorded along with the plot number.

At 100 feet in to the project area along the plot centerline, a chaining pin will be placed into the ground. A tape measure will be swung around this chaining pin for a radius of 100 feet. All trees less than 40 feet tall within this radius will be recorded. Trees that are close to 40 tall will be measured using a clinometer and tape, to accurately estimate the tree height.

- B. The plot will be reread, immediately following the completion of the project to determine if the objectives have been met, and then again on a 10 year basis to determine a maintenance schedule. When the total woody fuel loading exceeds 12 tons/acre, additional piling of fuels and burning of the piles will occur. When the total number of trees less than 40 feet tall exceed 25/acre, additional thinning, piling and burning will occur. When maintenance activity occurs, the plots will be reread to assure the treatment objectives are being met. The area will be maintained into the future so that the project objectives are met.

- C. Up to 3 standard fire effects monitoring plots will be installed within the project area in order to compare results to those from similar areas treated with prescribed fire. Although only limited information will be gained from such a small sample size, differences in understory composition and patterns may be documented and investigated further if necessary. Fuel accumulation rate and tree regeneration will also be documented in the plots. Protocols will follow those outlined in the NPS Fire Monitoring Handbook and SEKI FFMP Monitoring Plan.
- D. Due to concerns about the potential for non- native plant invasion into disturbed areas, directed surveys may be conducted in the treatment area. With assistance from the parks' exotic plant program staff, the status of pre- treatment presence of non- native plant species will be determined along with any changes that may occur 1 and 2 years following initial treatment and after further treatment.

Post Project Rehabilitation

All trails and roadways near the project area will be surveyed after the completion of the project for hazards caused by the operation. All identified hazards will be mitigated as soon as possible. All saw cuts will be flush- cut and cuts will be buried or disguised. Fire lines constructed within the project area will be established using minimum impact suppression techniques, and be rehabilitated per the guidelines contained within the Fire and Aviation Management Operations Guide (FAMOG).

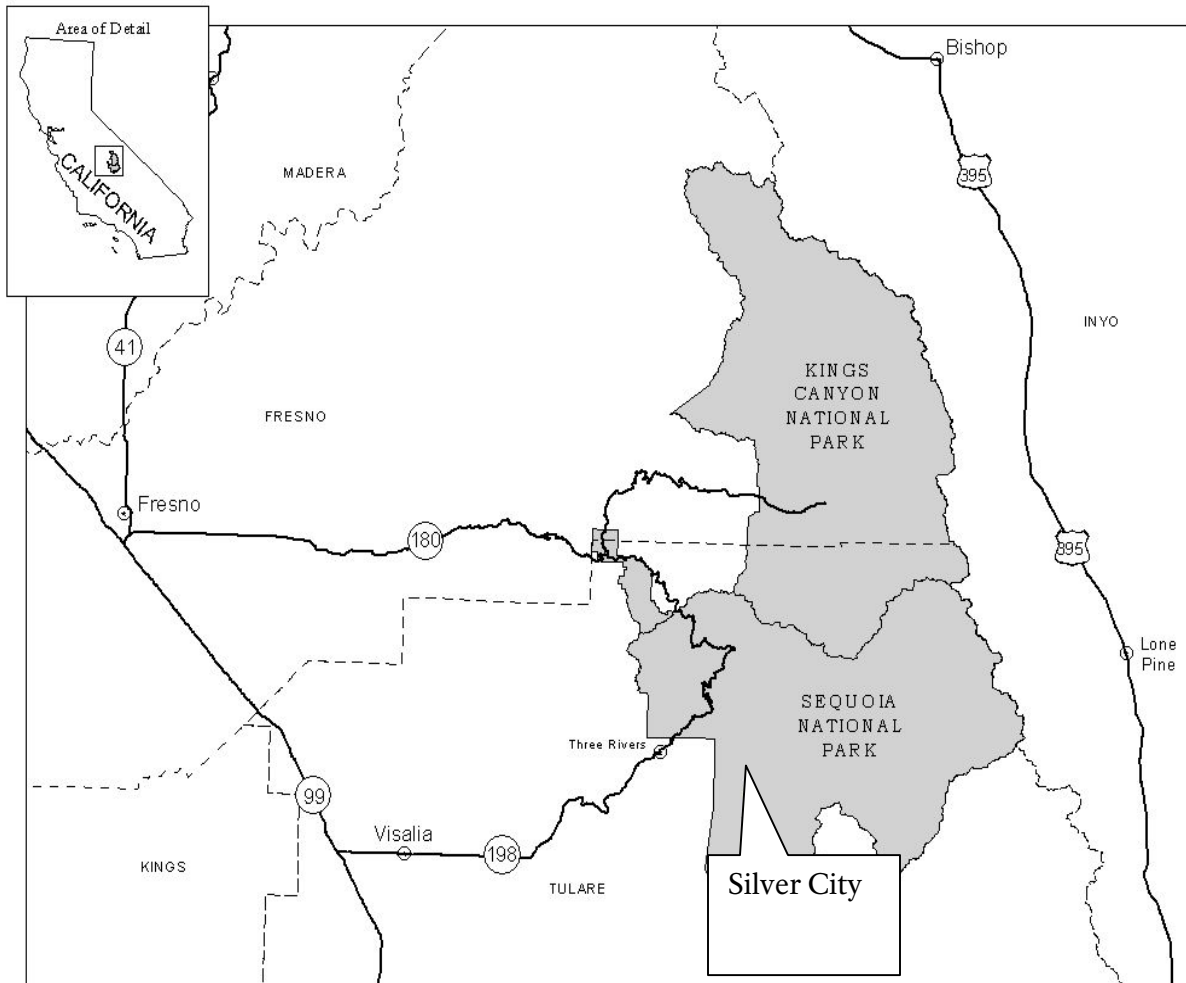
Post Project Reports

Fire Dispatch will maintain a project file with dispatch log, resource orders, OF- 288 and CTR forms, and project plan, Unit Logs.

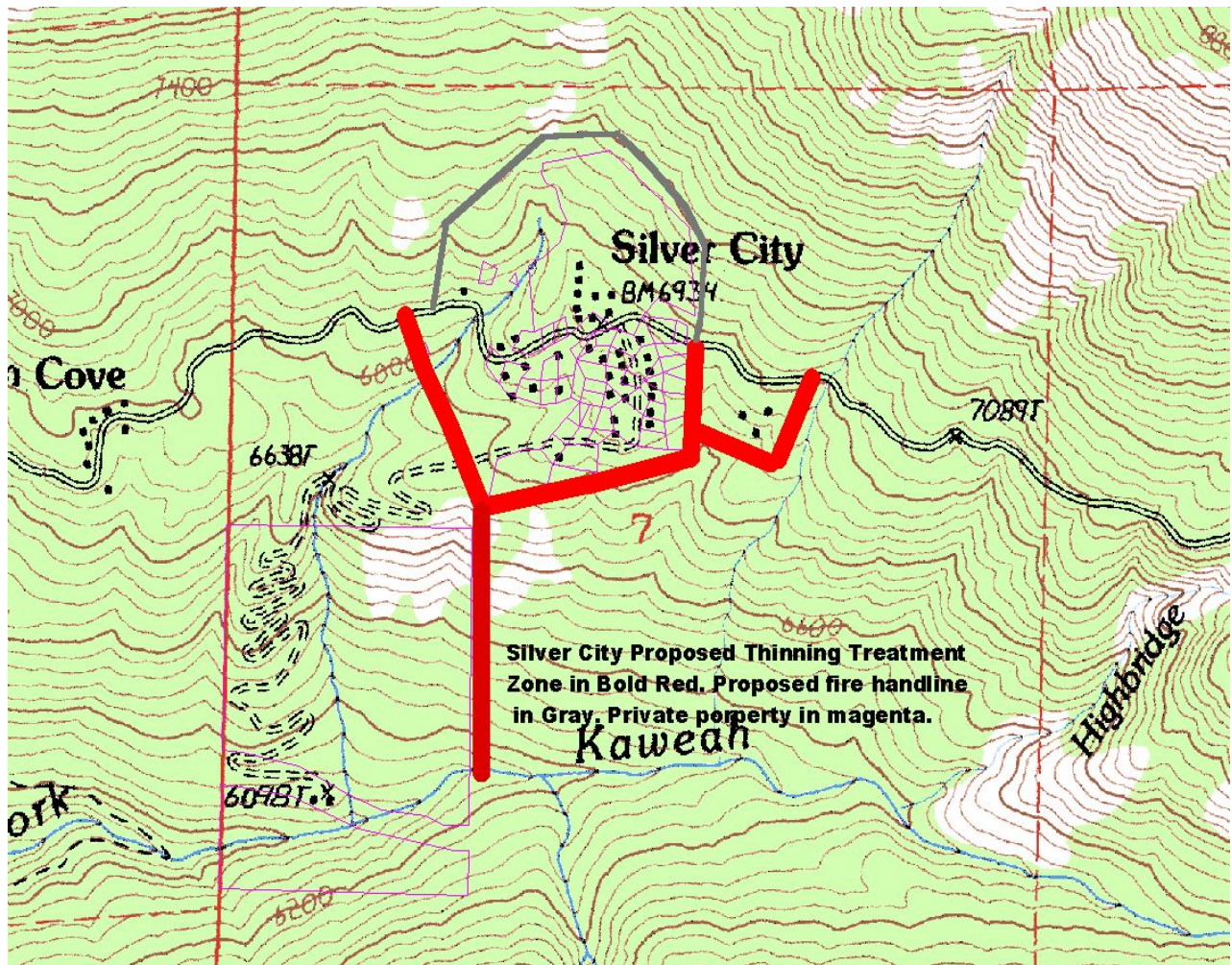
The Project Lead will maintain ICS- 214 Unit Logs.

The Project Lead will report to the park archaeologist the discovery of cultural artifacts.

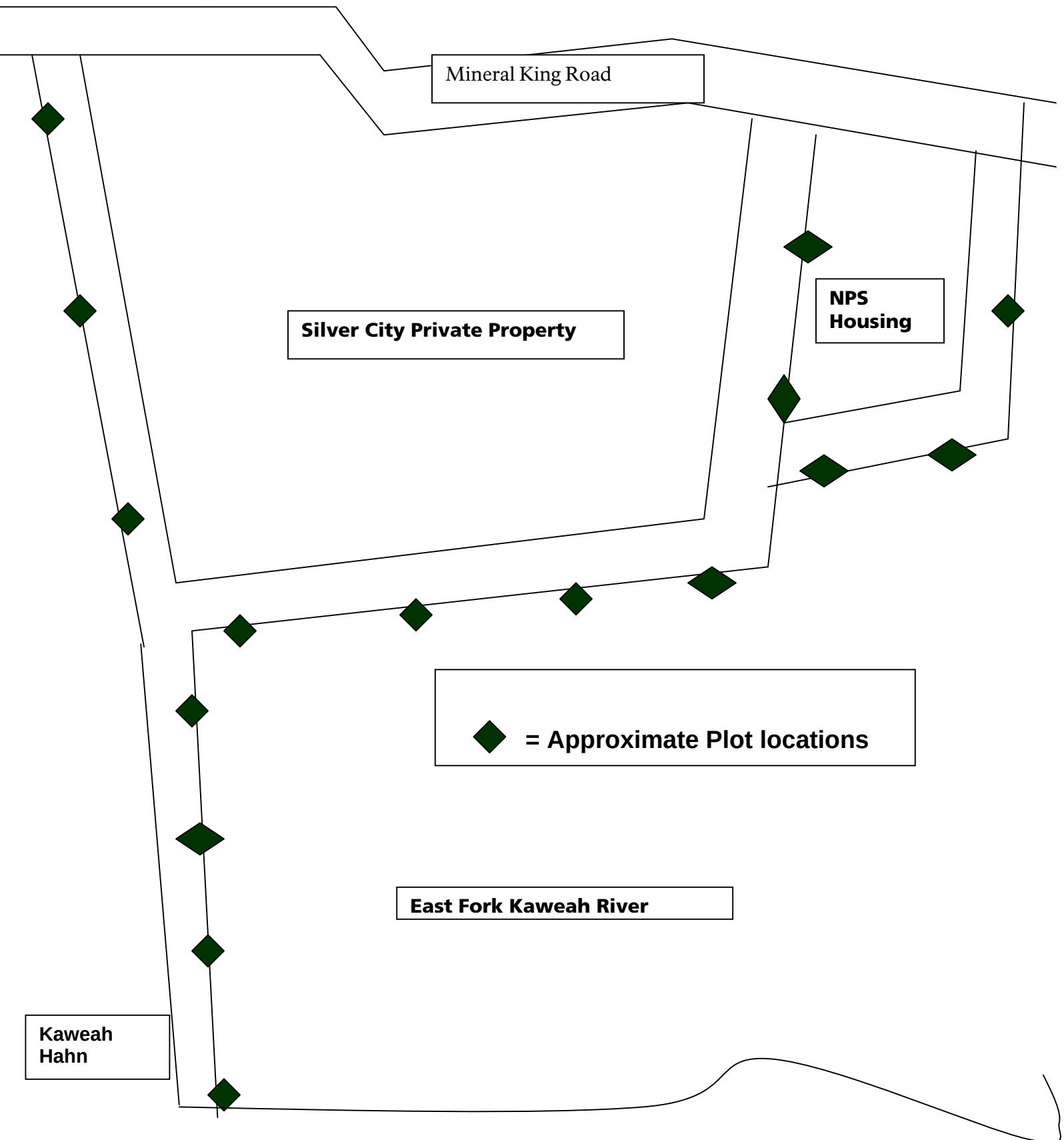
Vicinity Map



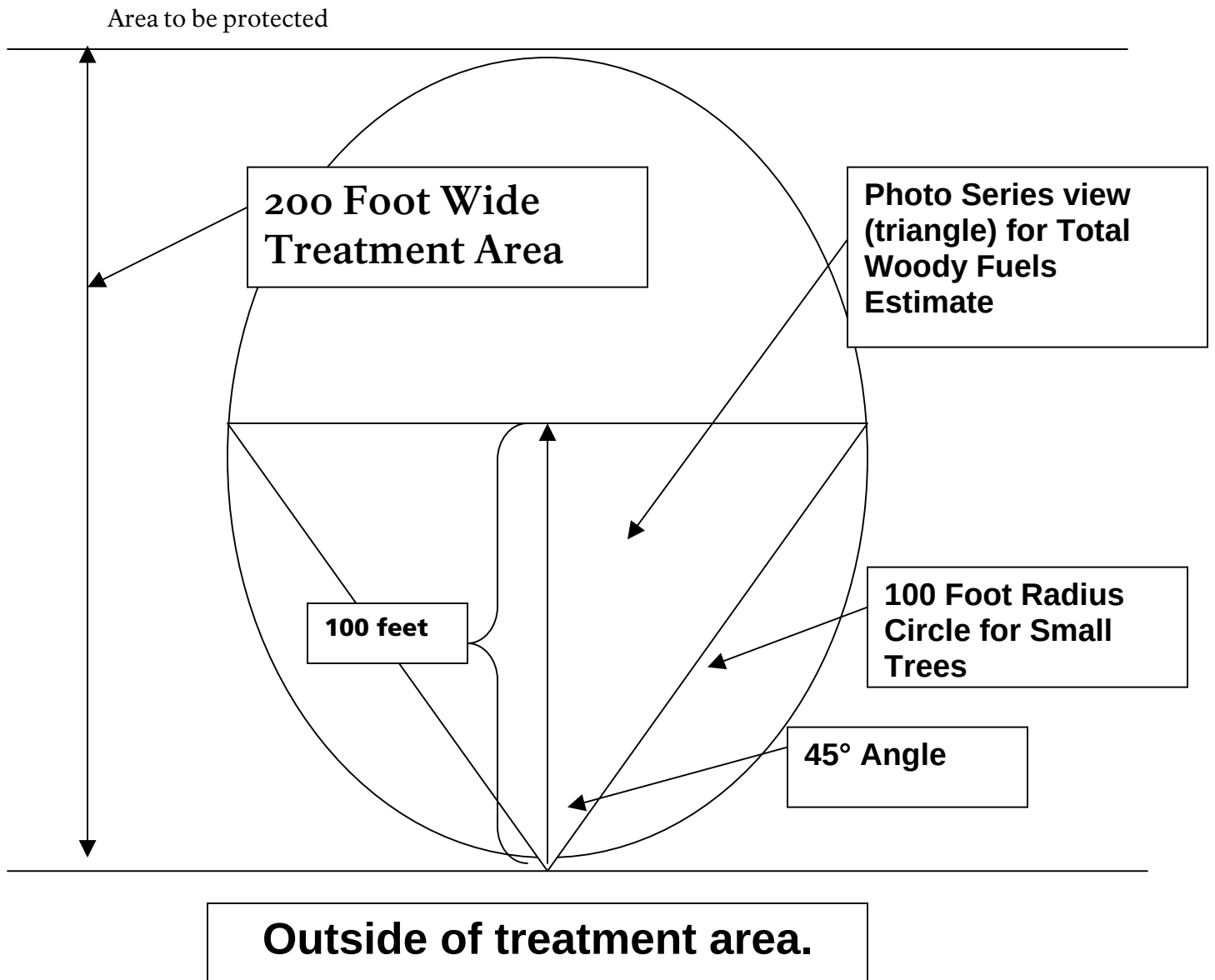
Project Map



Plot Diagram



Plot Detail



Park Review Comments

Project Name: Silver City Manual Fuels Treatment

Please note comments you have concerning this project plan.

Fire Management Officer:

Division of Visitor and Fire Management:

Division of Science and Resources Management:

Division of Cultural Resources and Interpretation:

Superintendent:

Other:

F) Delegation of Authority Example

Date: Calendar Year 2005—June to December

To: Incident Commander Assuming Jurisdiction in Fire Emergency at Devils Postpile National Monument

Cc: SEKI Superintendent, Richard Martin
SEKI FMO, William Kaage
SEKI Chief Ranger, J.D. Swed
SEKI Chief of Natural Resources, Peter Rowlands, DEPO Resource Advisor
YOSE Deputy Chief Ranger, Cam Sholly
SEKI Branch Chief of Fire and Vegetation, John Austin

From: Superintendent at Devils Postpile National Monument, Deanna M. Dulen

As Superintendent of Devils Postpile National Monument, I have the responsibility of ensuring the protection of monument resources and the lives of visitors and employees. I must also act responsibly in my dealings with monument neighbors. Your expertise in wildland fire management will assist me in fulfilling these responsibilities.

Your individual and/or team's actions will be guided by National Park Service (NPS) fire management policy, Office of Aircraft Services aviation policy, and be managed in accordance with the goals and objectives identified in the wilderness fire suppression of the NPS. Minimum Impact Suppression Tactics should be used as much as possible to reduce impacts on the Wilderness resource, the Middle Fork of the San Joaquin, and this highly valued recreational area. Use of motorized equipment in the Wilderness such as chainsaws, portable pumps, and helicopters is authorized. However, no backflow of fuel or retardant from pumps is permissible into the San Joaquin River or any water resource of the Monument. Use of dozers anywhere in the Monument is not authorized, and requests for such would require special approval by the DEPO Superintendent. In the event, that the wildfire would invade the 50 acres of developed area, the use of dozers would also require the DEPO Superintendent or Acting's approval.

To help communicate such policy so that your suppression efforts are successful, I am providing guidelines below:

- I. The safety of suppression forces, the public, and monument employees is of foremost importance during all phases of the incident. It is also important to minimize road and area closures, to the extent that this does not compromise safety concerns.
2. Protect life and property. Important monument facilities are the ranger station, employee housing area, and the pump house just north of the campground and along the river.

3. Special consideration must be given to the safety and protection of employees and the publics they serve. If an evacuation is needed, the monument staff will require three hours notice to ensure orderly and safe evacuation.
4. Emergency funds are available for suppression but must be fully justified. Manage the incident in the most cost efficient and effective manner.
5. You will be operating within a highly visited monument of which 750 of the 800 acres are designated Ansel Adams Wilderness, the Middle Fork of the San Joaquin River, and a state designated Wild Trout area. Please use suppression tactics commensurate with the resource. Special care must be given to the San Joaquin River to ensure that no retardant and foam enters this watershed, meadows, and associated ecosystems to the river and meadows. Environmental impacts and suppression scars are of greater concern than the total number of acres burned. Ensure that wilderness values are not compromised during any actions and that minimum impact suppression tactics are fully utilized during all management actions including rehabilitation operations.
6. The Upper Middle Fork of the San Joaquin riparian corridor, all meadows adjacent to riparian area and forest, the Devils Postpile formation, and Rainbow Falls are among the monument's most significant natural resources. Please use extra caution in these areas. Fire lines should **NOT** be constructed directly through meadows. On- the- ground suppression actions undertaken in the meadows will require prior approval of the monument's resource advisor. **Protection of the viewshed around Rainbow Falls** is requested with water drops on the forest on both sides of the Falls. Protection of the viewshed at Devils Postpile Formations is also requested with water drops on the immediate area. **NO** retardant should be used directly on the Postpile formation.
7. Keep management, visitors, employees, cooperators, and neighbors fully informed of your incident team's actions and decisions. Work with DEPO and SEKI staff to establish and maintain a pro- active information section, to work closely with local media, and maintain public information capabilities. We need the opportunity to review written material pertaining to the monument prior to dissemination to the media.
8. Develop and implement a short- term, and if deemed necessary long- term, rehabilitation plan for the impacts of the suppression effort. Also needed are emergency stabilization measures. All firelines will be rehabilitated according to NPS policy and plans approved by the resource advisor.
9. Provide a discrimination- free work site while assigned to the incident.
10. Complete fire effects monitoring throughout the duration of the fire. If possible, take advantage of opportunities to create video documentation of fire behavior and fire effects monitoring for possible future use in training sessions and informative video and interpretive programs.

William Kaage, Sequoia and Kings Canyon National Parks' Fire Management Officer (or his designate) will serve as the Agency Representative. Peter Rowlands, Chief of Natural Resources

at Sequoia and Kings Canyon National Parks (or his designate) will serve as the resource advisor.

As of *[insert date]*, I am delegating to you the authority to manage the *[insert name of fire]*. This delegation carries with it full responsibility for the management of the continuing suppression effort, and rehabilitation of the effects directly resulting from suppression activities within the area under your control. This delegation will remain in effect until I, or my designated Acting, receive a return memorandum from you turning authority for management back to the monument.

Sincerely,

/s/ DEANNA M. DULEN
SUPERINTENDENT

G) Fuels Management Prescriptions

Mechanical Hazard Fuels Abatement Standards

The following standards will be used for hazard fuels abatement projects conducted by park crews on NPS lands adjacent to structures, developments, and along boundary areas.

The removal of exotics should be favored over the removal of native species. Where feasible, exotics should be eliminated while native plants should be pruned or isolated from the ladder effect in order so that they may remain while providing a reasonable level of protection for structures.

There may be sensitive native plants in certain areas and the removal of nesting trees should be done after birds have vacated the nests. Coordinators of abatement projects will need to consult with the SEKI biologist before cutting questionable plant species or nesting trees.

Mid- elevation Areas

In mid- elevation areas where timber species comprise the main hazardous fuels, mechanical reduction work is done immediately adjacent to structures and out to about a 200- foot width on average in all directions. On steep slopes the areas down hill or below structures may need mechanical reduction work wider than 200 feet. In timber fuels shaded fuel break techniques are used. The following standards are based on PRC 4290.

- Remove flammable vegetation or leaf litter from the sides of structures to 30 feet out from the structures in all directions. Individual live shrubs or trees can remain as long as they are isolated from the ladder effect—the path that fires can travel in order to reach the structure’s sides or roof area.
- Along the sides of flammable foundations, scrape away fuels down to bare mineral soil. A 2- to 3- foot wide scrape is recommended.
- Remove all leaf litter from roofs.
- Remove all dead branches within a reasonable distance above roofs (large conifer trees could have dead branches high up in the tree that are not reachable).
- Remove all branches or vegetation within 10 feet of chimney outlets.
- All fireplace or wood stove chimney outlets must be covered with an ember- arresting screen that has openings no larger than ½ inch in size.
- There will be a maximum of 25 trees/acre less than 40 feet in height remaining after the thinning.
- All live trees over 40 feet tall will remain uncut. All larger trees remaining will be limbed up to at least 6 to 8 feet above the ground.
 - When removing a lateral branch at its point of origin on the trunk or parent limb, the final cut shall be made in branch tissue close to the trunk or parent limb, without cutting into the branch bark ridge or collar, or leaving a stub.
 - When removing a dead branch, the final cut shall be made just outside the collar of live tissue. If the collar has grown out along the branch stub, only the dead stub shall be removed. The live collar shall remain intact and uninjured.

- To prevent damage to the parent limb when removing a branch with a narrow branch attachment, the final cut shall be made from the bottom of the branch up.
- Tree branches shall be removed in such manner so as not to cause damage to other parts of the tree. Branches too large to support with one hand shall be pre-cut to avoid splitting or tearing of the bark
- Felled trees will be limbed and bucked down to an 8- inch top and piled for later burning. Tree boles larger than 8 inches in diameter will be left un- bucked. All tree boles left will remain in contact with the ground. All stumps will be flush cut and added to the burn piles.
- Dead & down woody material (1- 8 inches in diameter) will be gathered and piled with larger logs limbed and bucked to an 8- inch top and piled for later burning. Tree boles larger than 8 inches in diameter will be left un- bucked.
- Piles shall be appropriately sized and located in openings far enough away from residual vegetation in order to prevent or minimize scorch.
 - Piles shall have a minimum height of 3 feet and a maximum height of 6 feet.
 - Piles shall be located at least 15 feet from any residual green tree in the downhill or side-slope direction from the pile, and at least 20 feet from any residual green tree upslope of the pile.
 - Piles shall be constructed reasonably compact and free of soil to facilitate burning.
 - Piles shall also be constructed with enough fine material (less than ¼ inch diameter), such as twigs and needles, to easily ignite and burn the pile.
 - All piles should have a good base to prevent the pile from toppling.
 - Piles shall be covered with durable paper prior to precipitation. Water- resistant “Kraft” paper (Clean Burn Kraft Paper – available from <http://www.baileys-online.com/store.html>) or approved substitute may be used. No plastic material will be used to cover piles. The covering shall be placed over the center of the pile. The paper shall cover a minimum of 75% of the surface of each pile.
 - Pieces of branch wood shall be placed on the top to secure the paper against reasonable wind events.
- Larger brush patches will have a minimum 20- foot wide path cleared, and the cut material piled for later burning to facilitate future fire line construction located in a defensible area within the treatment area.
- Any stumps larger than 8 inches in diameter will be treated with borax to prevent root rot.

The treatment zone will be maintained on a regular and recurring basis.

- Established seedlings and saplings will be thinned every 10- 15 years to maintain stocking densities at prescribed levels favoring shade intolerant species. The slash generated will be piled and burned.
- The 20- foot wide cleared brush zone will be maintained by cutting sprouting brush on a 3- 5 year cycle. The cut material will be piled and burned.
- Re- accumulations of dead & down woody material will be gathered and piled with larger logs limbed and bucked to an 8- inch top and piled for later burning on a 1- 2 year cycle.

Hazard Abatement Along Boundary Areas

Where hazard abatement along monument boundary areas needs to be implemented, the treatments will follow the shaded fuel break methodology described above. For brevity reasons those standards are not duplicated here.

PREScribed FIRE BURNING PRESCRIPTIONS

Table H-1 – Prescriptions for Fuel Models 1-5

	Fuel Model 1 Annual Grass Head Fire Wind Upslope	Fuel Model 1 Annual Grass Backing Fire Wind Upslope	Fuel Model 2 Annual Grass with Overstory Head Fire Wind Upslope	Fuel Model 2 Annual Grass with Overstory Backing Fire Wind Upslope	Fuel Model 4 Tall Brush Head Fire Wind Upslope	Fuel Model 5 Low Brush Head Fire Wind Upslope
Environmental Conditions						
Air Temperature	30–90 f	30-90 f	30-90 f	30-90 f	30-85 f	30-80 f
Relative Humidity	20–60%	20-60%	20-60%	20-60%	20-60%	20-60%
Wind Speed	See Below	See Below	See Below	See Below	See Below	See Below
Slope	0–30%	0-100%	0-30%	0-100%	0-45%	0-35%
Fuel Moisture						
1 Hour Time Lag	5-10% mfws 0-2	3-4% mfws 0-4 5-10% mfws 0-2	6-11% mfws 0-2 12-13% mfws 0-6	4-9% mfws 0-4 10-13% mfws 0-2	5-9% mfws 0-4 10-12% mfws 0-8	5-7% mfws 0-2 8-12% mfws 2-8 w/ live fuel moisture of 100-150%
10 Hour Time Lag	N/A	N/A	7-12% mfws 0-2 13-14% mfws 0-6 15-16% mfws 0-10	5-10% mfws 0-4 11-14% mfws 0-2	6-10% mfws 0-4 11-13% mfws 0-8	6-12% mfws 0-2 9-13% mfws 0-8 w/ live fuel moisture of 100-150%
100 Hour Time Lag	N/A	N/A	8-13% mfws 0-2 14-15% mfws 0-6 16-17% mfws 0-10	6-11% mfws 0-4 12-15% mfws 0-2	7-11% mfws 0-4 12-14% mfws 0-8	N/A
1,000 Hr Time Lag	N/A	N/A	N/A	N/A	N/A	N/A
Live	N/A	N/A	50-100%	50-100%	50-150%	70-150%
Fire Behavior Outputs						
Scorch Height	N/A	N/A	0-30 ft.	0-30 ft.	N/A	N/A
Rate of Spread	2-35 chains/hour	2-8 chains/hour	1-16 chains/hour	1-3 chains/hour	2-120 chains/hour	2-17 chains/hour
Flame Length	0-4 ft.	.5-2 ft.	.5-4 ft.	.5-2.5 ft.	3-25 ft.	1-5 ft.
Heat per Unit Area	55-95 BTU/sq. ft.	100-110 BTU/sq. ft.	255-495 BTU/sq. ft.	255-525 BTU/sq. ft.	1570-2910 BTU/sq. ft.	215-715 BTU/sq. ft.
Fireline Intensity	3-60 BTU/sq. ft./second	4-15 BTU/sq. ft./second	4-145 BTU/sq. ft./second	4-30 BTU/sq. ft./second	50-6330 BTU/sq. ft./second	7-221 BTU/sq. ft./ second

NOTE: These are generalized burning prescription parameters. Fire management staff are responsible for reviewing topography outside the range listed and adjusting ignition pattern and rate of firing in order to meet burn plan objectives. Reduction of scorch can be accomplished as needed generally with nighttime ignition and with humidities higher than 30%.

Table H-2 – Prescriptions for Fuels Models 8-10

	Fuel Model 8 Closed Timber and Short Needle Conifer Head Fire Wind Upslope	Fuel Model 9 Broadleaf Deciduous Hardwoods and Long Needle Pine Head Fire Wind Upslope	Fuel Model 9 Broadleaf Deciduous Hardwoods and Long Needle Pine Backing Fire Wind Upslope	Fuel Model 10 Timber Litter Head Fire Wind Upslope	Fuel Model 10 Timber Litter Backing Fire Wind Upslope
Environmental Conditions					
Air Temperature	40-85 f	40-85 f	40-85 f	40-75 f	40-85 f
Relative Humidity	20-60%	20-60%	20-60%	20-60%	20-60%
Wind Speed	See Below	See Below	See Below	See Below	See Below
Slope	0-60%	0-45%	0-100%	0-45%	0-100%
Fuel Moisture					
1 Hour Time Lag	3-10% mfws 0-10	5-7% mfws 0-6 8-12% mfws 0-8	3-10% mfws 0-4	5-7% mfws 0-6 8-12% mfws 0-8	3-10% mfws 0-4
10 Hour Time Lag	4-11% mfws 0-10	6-8% mfws 0-6 9-13% mfws 0-8	4-11% mfws 0-4	6-8% mfws 0-6 9-13% mfws 0-8	4-11% mfws 0-4
100 Hour Time Lag	5-12% mfws 0-10	7-9% mfws 0-6 10-14% mfws 0-8	5-12% mfws 0-4	7-9% mfws 0-6 10-14% mfws 0-8	5-12% mfws 0-4
1,000 Hr Time Lag	10-20%	10-20%	10-20%	10-20%	10-20%
Live	N/A	N/A	N/A	N/A	N/A
Fire Behavior Outputs					
Scorch Height	0-30 ft.	0-30 ft.	0-30 ft.	0-30 ft.	0-30 ft.
Rate of Spread	0-8 chains/hour	1-18 chains/hour	0-1 chains/hour	1-18 chains/hour	0-1 chains/hour
Flame Length	0-2.5 ft.	1-4 ft.	.5-3 ft.	1-4 ft.	.5-3 ft.
Heat per Unit Area	165-225 BTU/sq. ft.	320-390 BTU/sq. ft.	350-450 BTU/sq. ft.	320-390 BTU/sq. ft.	350-450 BTU/sq. ft.
Fireline Intensity	1-35 BTU/sq. ft. /second	4-120 BTU/sq. ft. /second	4-60 BTU/sq. ft. /second	4-120 BTU/sq. ft. /second	4-60 BTU/sq. ft. /second

NOTE: These are generalized burning prescription parameters. Fire management staff are responsible for reviewing topography outside the range listed and adjusting ignition pattern and rate of firing in order to meet burn plan objectives. Reduction of scorch can be accomplished as needed generally with nighttime ignition and with humidities higher than 30%.

Addendum

Inyo National Forest Suppression Response Plan

SEKI Fire and Aviation Management Operations Guide

SEKI Smoke Communication Strategy

SEKI Standard Operating Procedures: Fire and Fuels Information

Wildland and Prescribed Fire Management Policy Implementation Procedures Reference Guide

Interagency Standards for Fire and Fire Aviation Operations 2005 Handbook.

Fire and Fuels Monitoring Plan. Appendix C of the Sequoia & Kings Canyon National Parks' *Fire and Fuels Management Plan*. 2003.